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CALENDAR OF THE SCHOOL OF MINING

(Affiliated to Queen's University)

KINGSTON, - ONTARIO.

ELEVENTH SESSION, 1903-1904

KINGSTON:
PRINTED AT THE BRITISH WHIG OFFICE,
1903.

All communications to be addressed to

The Secretary, School of Mining, Kingston, Ontario.

Queen's University
Library

KINGSTON, ONTARIO

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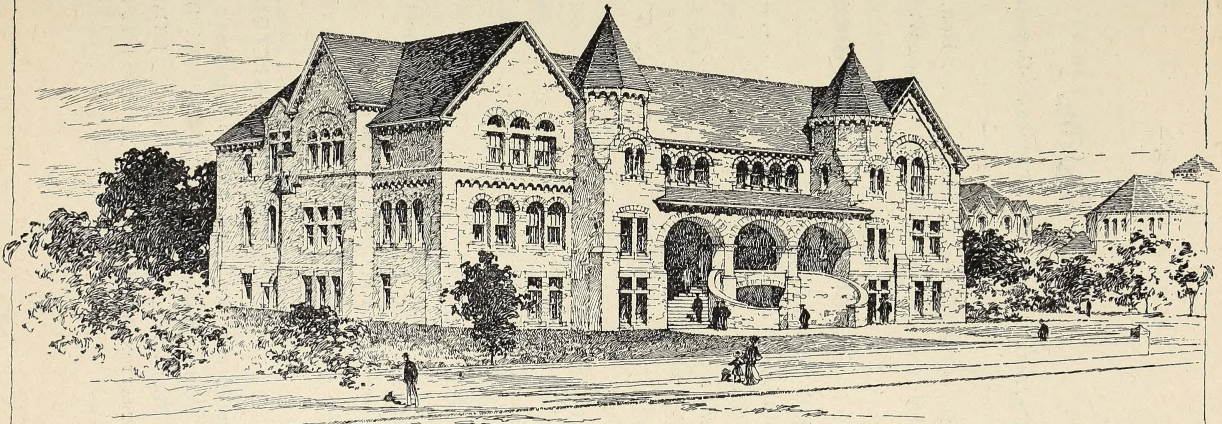

GEOLOGY MINERALOGY AND PHYSICS BVILDING
SCHOOL OF MINING KINGSTON ONT.
SYMONS & RAE ARCHITECTS TORONTO.

VISITOR.

Mortimer Clark, K. C., Lieutenant-Governor of Ontario.

Chairman of the Board of Governors	Hon. Wm. Harty, M.P.
Vice-Chairman	W. Bruce Carruthers

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J. L. Haycock, Cataraqui

TABLE OF CONTENTS.

Board of Governors 4
Calendar 8
Time Table 7
Junior and Senior Matriculation Examinations 11
Supplemental Examinations 11
Examinations (April, 1904) 12
Faculty 14
Announcement 15
Expenses of a Course 16
Requirements for Admission 17
Scholarships 23
Fees 25
Courses of Study 27
Four Years' Courses 27
Three Years' Courses 27
Six Years' Courses 38
Science Courses in Queen's University 35
Subjects of Study 43
Mining Laboratory 77
Field Classes 94
Mineral and Geological Specimens 94
Gifts, &c 95
List of Graduates 98
List of Students 101
Scholarships Awarded, 1902 104
Pass Lists 105

CALENDAR.

1903.

Sept. 2—Notice of intention to appear at Matriculation or Supplemental Pass Examination to be given in writing to the Registrar of Queen's University. Subjects upon which a candidate intends to write must be stated in his notice.

Sept. 17—Supplemental Pass Examinations begin.

" 16—Surveying Class (second year) begins.

" 17—Matriculation Examinations begin.

" 30—Classes open. (1st term.)

Oct. 7—Holiday for Athletic Games.

Dec. 19—Christmas Holidays begin.

1904.

Jan. 5—Classes re-open. (2nd term.)

Feb. 17—Holiday.

Mar. 30—Class work closes.

April 3—Examinations begin.

" 25—Meeting of Faculty to consider reports of examiners.

" 27—Convocation for distributing prizes, announcing honors, and laureating graduates.

LABORATORIES.

The hours marked L in the time-table and others at which students have no lectures are to be given to Laboratory work.

Laboratory work consists of work in the Draughting room, in the Mechanical shops, the Physical laboratories, and in the Chemical Mineralogical, Petrographical and Assay laboratories.

As early as possible in the session students must arrange the hours for doing laboratory work with the Professors in charge, and so as not to interfere with their class work.

TIME TABLE.

FIRST YEAR.

	VIII.	IX.	X.	XI.	XII.	II.	III.	IV.
MON.		Elem. Min. *Elem. Cryst.	Trig. I.	Jr. Chemistry.	Math. I. Algebra.	Jr. Chemistry (Practical)	Math. I. Geometry.	L.
TUES.		*Elem. Cryst. L.	L.	Jr. Chemistry.	L.	Physics I.	Jr. English.	L.
WED.	Jr. English.	*Elem. Cryst. L.	L.	Mathematics I. Algebra.	L.	Physics I.	Math. I. Geometry.	L.
THURS.		*Elem. Cryst. L.	Drawing I. L.	Drawing I. L.	L.	Physics I.	Jr. English.	L.
FRIDAY.	Jr. English.	*Elem. Cryst. L.	Math. I. Algebra.	Astronomy I. †Trig. I.	L.	Blow Pipe Analysis.	Math. I.	L.
SAT.	**Qualitative Analysis. †Mineralogical Excursions.	†Excursions.	L. †Excursions.	L. †Excursions.	L. †Excursions.	L. †Excursions.	L. †Excursions.	L. †Excursions.

*Course of 15 lectures at beginning of session. **Second term. †First term.

TIME TABLE.

SECOND YEAR.

	VIII.	IX.	X.	XI.	XII.	II.	III.	IV.
MON.		Surveying I.	Math. II. Sol. Geometry	L. Gen. Eng. I.	L.	Syst. Min. †Optical Min.	Physics II.	
TUES.		Botany.	Math. II. Conics. Botany.	L.		Geology I.		L.
WED.	Math. II. Conics.	Botany. Surveying I.	L. Botany.	Syst. Min. †Optical Min.	L.	Descr. Geometry.	Descr. Geometry.	Descriptive Geometry.
THURS.		Botany. Gen. Eng. I.	Math. II. Calculus. Botany.	Sr. Chemistry.		Geology I.	Mapping I.	Mapping I.
FRIDAY.	Math. II. Calculus.	L.	L.	Sr. Chemistry,	L.	L.	Physics II.	Spher. Trig. Math. II. Astronomy.
SAT.	Geological Excursions.	L.	L.	L.	L.	L.	L.	L.

‡First term. †Second term.

TIME TABLE.

THIRD YEAR.

	VIII.	IX.	X.	XI.	XII.	II.	III.	IV.
MON.	Descrip. Deter. Min.	Elec. Eng. I. Animal Biology.	Geology II.	Metallurgy I. Elect. Eng. II.		General Engineering II.	Industrial Chemistry. ‡I, †II.	Ore Dressing.
TUES.	Surveying II.	Thermodynamics. I.	Geology II.	Mech. Eng. I. Metallurgy I.		Indus. Chem. ‡I, †II.	Mechanism.	Ore Dressing.
WED.	Descrip. Deter. Min.	Animal Biology. Descrip. Deter. Min.	Geology II.	Mining I.		Graphic Statics.	‡Organ. Chem. †Physical Chemistry. I.	
THURS.	Descrip. Deter. Min.	Thermodynamics. I.	Geology II.				‡Organ. Chem. Mapping. II.	Mapping, II.
FRIDAY.	Descrip. Deter. Min.	Mech. Eng. I. Animal Biology. Survey'g, II.	Geology II.	Mining I. Elec. Eng. II.		General Engineering II.	‡Organ. Chem. †Physical Chemistry. I.	Indus. Chem. ‡I, †II.
SAT.	†Quantitative Analysis and Assaying during the whole day. Geological Excursions will be made during Oct. and Nov.							

‡First term. †Second term.

TIME TABLE.

FOURTH YEAR.

	VIII.	IX.	X.	XI.	XII.	II.	III.	IV.
MON.		Mining II.		Geology III.		Elec. Eng. IV. Metallurgy II.	Industrial Chem. ‡I Elec. Lab.	Elec. Lab.
TUES.		Des. and Min. Project. Surveying III.	Phys. Chem .II. Mining II. Des. and Min. Project.	Geology III. Des. and Min. Project.	Mining II.	Elec. Eng. IV. Indus. Chem. ‡I. Elec. Lab.	Elec. Lab.	†Mining Law. Metallur.II. Elec. Lab.
WED.		Mining II. Mech. Eng. IV.		Thermodynamics. Geology III. Structural Designing.		Mech. Engineering IV.	Metallurgy II.	†Mining Law.
THURS.		Metallurgy III.	General Engineering. Met. Lab.	Mech. Eng. IV. Geology III. Met. Lab.	Mining III. Met. Lab.	Met. Lab. Elec. Eng. V. Des. and Min. Project.	Elec. Eng. V. Des. and Min. Project. Met. Lab.	Elec.Eng.V. Des. and Min. Project. Met. Lab.
FRIDAY.	Milling.	Milling.	Milling.	Geology III. Milling.	Milling.	Milling. Elec. Eng. V.	Milling. Elec. Eng. V.	Milling. Elec. Eng. V.
SAT.	Milling.	Milling	Milling.	Milling.	Milling.			

‡First term. †Second term.

JUNIOR AND SENIOR MATRICULATION EXAMINATIONS.

SEPTEMBER, 1903.

		9 a.m.	2 p.m.
Thursday,	17th Sept.	—English Composition.	English Literature.
Friday,	18th "	—History.	Euclid.
Saturday,	19th "	—Latin.	Latin Authors and Composition.
Monday,	21st "	—Physics.	
Tuesday,	22nd "	—Arithmetic,	Algebra.
Wednesday,	23rd "	—French Authors.	French Grammar and Composition.
Thursday,	24th "	—German Authors.	German Grammar & Composition.
Friday,	25th "	—Botany.	Animal Biology.
Saturday,	26th "	—Chemistry.	English Grammar.

SUPPLEMENTAL EXAMINATIONS.

SEPTEMBER, 1903.

		9 a.m.	2 p.m.
Thursday,	17th Sept.	—Junior English.	
Monday,	21st "	—Physics, I.	Physics, II.
Tuesday,	22nd "	—Mathematics.	Mathematics, II.
Wednesday,	23rd "	—Mineralogy.	Geology.
Friday,	25th "	—Botany.	Animal Biology.
Saturday,	26th "	—Junior Chemistry.	Senior Chemistry.

Dates for the other subjects will be fixed in September.

EXAMINATIONS.

APRIL, 1904.

		9 A.M.	2 P.M.
Thursday,	March 31st	Drawing, I.	Descriptive Geometry.
Friday	April 1st	Drawing, II. Foundations Physics, IV. Petrography, I. (Practical)	
Saturday	" 2nd	Electrical Engineering, IV. Spherical Trigonometry and Astronomy	Quantitative Analysis and Assaying (Written). Astronomy, I.
Monday	" 4th	Petrography, II. (Practical)	Mineralogy, Descriptive and Deter. (Written). Mineralogy (Systematic).
Tuesday	" 5th	Mathematics, I., Trigonometry Petrography, I.	Mineralogy (Optical).
Wednesday	" 6th	Junior English Geology (Practical)	Elementary Mineralogy. Thermodynamics. I.
Thursday	" 7th	Surveying, I. Geology, II. Petrography, II. General Engineering, II.	Mechanism. Geology, I.
Saturday	" 9th	Geology of Canada, II. (Geology II.)	Mining, II. Physics, II.

Monday	"	11th	Mechanical Engineering, II. Railway Construction, I.	Metallurgy, I
Tuesday	"	12th	Mathematics, II. (A.)	Mining, I.
Wednesday	"	13th	Mechanical Engineering, I. Ore Dressing, III. Electrical Engineering, V. Physics, I.	Geology, III. Mathematics, II. (B).
Thursday	"	14th	Industrial Chemistry	Graphical Statics. Railroad Construction (1 hour).
Friday	"	15th	Junior Chemistry Economic Geology Municipal Engineering Electrical Engineering, III.	Senior Chemistry.
Saturday	"	16th	Metallurgy. II, Electrical Engineering, II. Botany	Chemistry (Physical). Surveying, III. Animal Biology.
Monday	"	18th	Chemistry (Organic) Mathematics, I. Algebra Mechanical Engineering, II.	Physics, III. Conics, I.
Tuesday	"	19th	Electrical Engineering, I. Thermodynamics, II	General Engineering, I.
Wednesday	"	20th	General Engineering, III	Surveying, II.
Thursday	"	21st	Railway Construction, II. Mathematics I. Geometry	Calculus, I.

FACULTY.

Nathan F. Dupuis, M.A., F.B.S., F.R.S.C.—Professor of Mathematics and Mechanism and Dean of Faculty.

William L. Goodwin, B.Sc. (Lond.) D.Sc. (Edin.) F. R. S. C.—Professor of Chemistry and Director of School of Mining.

William Nicol, M.A.—Professor of Mineralogy and Assaying.

W. G. Miller, B.A.—Professor of Geology and Petrography.

L. W. Gill, B.Sc.—Acting Professor of General and Electrical Engineering.

Stafford Kirkpatrick, M.Sc.—Acting Professor of Metallurgy.

Reginald Brock, M.A.—Acting Professor of Geology and Petrography.

J. C, Gwillim, B.Sc.—Acting Professor of Mining Engineering.

D. H. Marshall, M.A., F.R.S.E.—Professor of Physics

N. R. Carmichael, M.A.—Associate Professor of Physics.

John Waddell, B.A., D.Sc., Ph.D.—Lecturer on Chemistry.

Capt. J. L. Bogart, C.E.—Lecturer on Surveying.

F. R. Sharpe, B.A. (Cantab.)—Lecturer on Applied Mathematics.

W. C. Baker, M. A.,—Demonstrator in Physics.

A. Kirkpatrick.—Lecturer on Civil Engineering.

W. L. Lodge, B.A.—Fellow in Chemistry.

Demonstrators.

J. W. Hazlett, B.A.—Chemistry.

F. H. McDougall, B.A.—Chemistry.

M. B. Baker, B.A., B,Sc.—Geology.

Dr. Waddell, Librarian.

Geo Y. Chown, B.A., Secretary-Treasurer.

Professors of Queen's University whose classes are attended by Students of the School of Mining.

English	Jas. Cappon, M.A., J. Marshall, M.A.
Botany	Jas. Fowler, M.A., LL.D., F.R.S.C.
Animal Biology	A. P. Knight, M.A., M.D.
German	John MacGillivray, Ph.D. (Leipsic).
French	P. G. C. Campbell, B.A. (Oxon).

ANNOUNCEMENT.

The School of Mining is a branch of the *School of Mining and Agriculture*, incorporated by Act of Legislature of Ontario. It is affiliated to Queen's University, which confers all degrees.

OBJECTS—The objects of the School of Mining are to give a thorough scientific education, both theoretical and practical, to men studying for the professions of the mining, civil, electrical, mechanical, chemical or sanitary engineer, the assayer, the consulting geologist, and the metallurgist; and to provide for prospectors, mine foremen, and others interested in the discovery and winning of minerals, such instruction as shall make their occupations more interesting and less liable to failure.

SITUATION—The School has been placed near Queen's University so as to take advantage of the instruction therein provided in English, French, German, mathematics, physics, and the biological sciences. It is in this way possible to equip and carry on a first-class technical school on a much smaller revenue than would otherwise be called for to maintain the high standard of scholarship which the age demands of the engineering profession.

Kingston is well situated as the seat of a Mining School. Geology and mineralogy, two of the fundamental subjects of a mining engineer's education, are studied to best advantage where the minerals can be seen as they lie in nature, and where geological formations can be examined *in situ*. In a few hours a class of students can be taken by carriage to a region so rich in mineral species that about forty different kinds have been secured in an afternoon. There is also a great variety of geological formations within easy access. If to this be added the neighborhood of mines in process of development or in operation, the result is an ideal Mining School city. The German Government has planted its mining schools in such cities, where the education of the mining engineer can be given that practical turn which not only lends a charm to the period of his study but shortens the time between graduation and thorough efficiency and confidence in the practice of his profession.

The possibilities of the country to the north of Kingston are, in these respects, very great, and a glance at a geological map shows that the city itself is situated where the mineral-bearing formations, cutting like a broad wedge through the limestone, reach the St. Lawrence and Lake Ontario. The region of mineral-bearing rocks is thus brought almost to the city. On either side, the water front is bordered by a band of limestone, broadening as it extends east and west.

Employment for Graduates—While no engagement is made to secure employment for graduates of the School, those who show themselves capable and industrious will, if possible, be recommended to positions for which they are qualified. It must be distinctly understood, however, that recommendations will not be given to men merely because they have been students at this School.

Certificates of Standing—Employers of mining engineers and assayers are requested to note that men who have studied here can produce certificates stating clearly their standing in the School; and that no one is entitled to style himself a graduate of the School unless he has completed either a three years' or a four years' course.

Expenses of a Course—The following statement of expenses is made from information obtained from students who have kept an acconnt of their expenditures. Personal expenses are not included in the estimate. The average expense for class fees is taken in this estimate.

FOR EACH SESSION.

Board, lodging and washing	$ 98 00	to	$120 00
Books and Stationery	10 00	"	12 50
Incidentals	9 00	"	16 00
Excursions (geology, mineralogy and mining ,	8 00	"	12 00
Class and other fees	66 00	"	66 00
	$191 00		$226 50

These estimates are based on board, &c., at from \$3 to \$4 per week, at which rates good board can be had in Kingston.

The fee for graduation is not included in the estimate.

REQUIREMENTS FOR ADMISSION.

The School of Mining is open to all who wish by earnest study to enlarge their knowledge of minerals and mines, or to pursue science for its own sake. The atmosphere of the School is suitable only for those who are fond of steady work.

REGISTRATION—All students are required to register and to pay the registration, athletic and class fees at the beginning of each session.

MATRICULATION—A candidate may enter upon a course with a view to obtaining a diploma or the degree of B. Sc. upon any of the following conditions :—

1. Having matriculated in any University in the British Empire or the United States.

2. Having passed the Junior Leaving or Junior Matriculation Examination of the Department of Education of Ontario, in English Grammar, Composition and Literature, Arithmetic, Mensuration, Algebra, and Geometry, History of Great Britain and Canada, Physics and Chemistry. The matriculation examination may also be taken in Queen's University in September. (See page 11.) Other examinations will be accepted, so far as they are equivalent.

3. Having been engaged for one year in engineering or surveying, or in a manufacturing establishment, and having passed the September Matriculation Examination in (*a*) Arithmetic, (*b*) Algebra to quadratic equations inclusive, (*c*) the first three books of Euclid or their equivalent in any other work in Geometry, and (*d*) English composition and dictation.

While students are admitted upon matriculating in the subjects mentioned, it is strongly urged upon them to take the complete matriculation examination with the modern language and science option. (See page 29, Calendar of Queen's University.

Students are advised to follow the arrangement in years as closely as circumstances will permit. The first four subjects mentioned in the first year form the basis for the work of succeeding years, and they should be thoroughly mastered. The country needs for its development men of high scientific attainments combined with practical knowledge. It is impossible to reach this without a good preliminary training in Mathematics, English, Physics and Chemistry.

4. Students who have already taken, in a university arts or science faculty or in a recognized technical or military school, subjects included in a degree course in the School of Mining will, on entering upon a course for the degree of B. Sc., be admitted to the year for which they are qualified.

The B. Sc. course in Chemistry and Mineralogy or in Mineralogy and Geology can be completed in one year after graduation in an honour course in Arts, in Chemistry, Mineralogy and Geology.

SPECIAL STUDENTS—Students not proceeding to a degree may take any classes for which they are prepared. The work in Chemistry, Mineralogy, Geology, Drawing, Surveying, etc., is so arranged that those who wish to study these subjects, either for their scientific interest or as leading to professions other than mining engineering, may profitably pursue their studies here.

The practical work in Assaying, Mineralogy, Milling and Mining is of such a nature that those who wish to prepare themselves for any special department of work connected with Mining and Milling may profitably spend a session or two at the School. A two years' course might include Junior Chemistry, Blowpipe Analysis, Qualitative Analysis, Systematic Mineralogy, and Geology, the first year; and Chemistry of Metals, Assaying, Descriptive and Determinative Mineralogy, Mining, Milling, Ore Dressing, and Ore Deposits, the second year.

SUBJECTS OF JUNIOR MATRICULATION.

ENGLISH GRAMMAR AND RHETORIC.

The main facts in the development of the language. Etymology and Syntax, including the inflection, classification, and elementary analysis of words and the logical structure of the sentence.

One examination paper.

ARITHMETIC.

Arithmetic.—Elementary Rules; Fractions (Vulgar and Decimal), Interest, Discount, and easy problems in Stocks.

One examination paper.

HISTORY OF GREAT BRITAIN AND CANADA.

Great Britain and Canada from 1763 to 1885, with the outlines of the preceding periods of British History.

The Geography relating to the period prescribed.

One examination paper.

PHYSICS.

Use of the metre rule; use of calipers and vernier for more accurate metric measurements (*e.g.,* diameters of wires, thickness of glass, plates, etc.); numerical calculation in the metric system.

Use of balance.

Specific gravity, by specific gravity bottle and hydrostatic balance, of liquids and of solids.

Boyle's law; barometer, diffusion of gases.

Use of Fahrenheit and Centigrade thermometers; determination of zero and boiling point dependent on pressure.

Expansion of solids, liquids and gases, examples.

Specific heat; latent heat; easy numerical examples.

Transmutation of matter; indestructibility of matter.

Solution, precipitation, crystallization and evaporation.

One examination paper.

GREEK.

Translation into English of passages from prescribed texts.

Translation at sight (with the aid of vocabularies) of easy Attic prose, to which special importance will be attached.

Grammatical questions on the passages from prescribed texts will be set, and such other questions as arise naturally from the context.

Translation from English into Greek of sentences and of easy narrative passages based upon the prescribed prose texts.

1904, 1905 { Selections from Xenophon, Anabasis I, in White's Beginner's Greek Book (pp. 304-428) with the exercises thereon; Homer, Iliad I.

Two papers will be set: (1) Prescribed texts and translations at sight, questions on grammar; (2) the translation of English into Greek.

LATIN.

Translation into Latin of English phrases and easy sentences to illustrate Latin accidence and the common rules of Latin syntax.

Translation into Latin of easy narrative English based upon the first twenty-five chapters of the prescribed Caesar.

Translation at sight (with the aid of vocabularies) from some easy prose author.

Translation from prescribed texts, with grammatical and other questions naturally arising from the extracts set for translation.

The following are texts prescribed:—

1904, 1905: Cornelius Nepos, Lives of Themistocles, Aristides and Hannibal; Cæsar, Bellum Gallicum, Bk. IV. (omitting chap. 17) and Bk. V, chaps. 1-23; Virgil, Æneid, Bk. II. (1-505.)

Two papers will be set: (1) Translation of English into Latin. (2) Prescribed texts and translation at sight, with questions on grammar, etc.

MATHEMATICS.

Algebra.—Elementary rules, Highest Common Measure, Lowest Common Multiple, Fractions, Square Root, Simple Equations of one, two and three unknown Quantities, Indices, Surds, Quadratics of one and two unknown quantities.

One examination paper.

Geometry.—Euclid: I, II and III; Easy Deductions.

One examination paper.

FRENCH.

The candidate's knowledge of French will be tested by: (1) simple questions on Grammar, (2) the translation of simple passages from English into French, (3) translation at sight of easy passages from modern French, and (4) an examination on the following texts:

1904: LAMENNAIS, Paroles d'un croyant, (Chaps. VII and XVII); PERRAULT, le Maître Chat ou le Chat Botté; DUMAS, Un nez gelé and la Pipe de Jean Bart; ALPHONSE DAUDET, la Dernière classe and la Chèvre de M. Seguin;; LEGOUVÉ, la Patte de dindon; POUVILLON, Hortibus; LOTI, Chagrin d'un vieux forçat; MOLIÉRE, l'Avare, Acte III, sc. 5 (Est-ce à votre cocher....sous la mienne) ; VICTOR HUGO, Waterloo, (chap. IX) ; ROUGET DE L'ISLE, la Marseillaise; ARNAULT, la Feuille; CHATEAUBRIAND, l'Exile; THÉOPHILE GAUTIFR, la Chimère; VICTOR HUGO, Extase; LAMARTINE, l'Automne; DE MUSSET, Tristesse; SULLY PRUDHOMME, le Vase brisé; LA FONTAINE, le Chêne et le Roseau.

DAUDET, la Belle Nivernaise.

1905: LAMENNAIS, Paroles d'un croyant (Chaps. VII and XVII) ; PERRAULT, Le Maître Chat, ou le Chat Botté; DUMAS, Un nez gelé and la Pipe de Jean Bart; ALPHONSE DAUDET, la Dernière classe, and la Chèvre de M. Seguin; LEGOUVÉ, la Patte de dindon; POUVILLON, Hortibus; LOTI, Chagrin d'un Vieux forçat; MOLIÉRE, l'Avare, Acte III, sc. 5 (Est-ce à votre cocher ....sous la mienne) ; VICTOR HUGO, Extase; LAMARTINE, l'Automne; DE MUSSET, Tristesse; VICTOR HUGO, Waterloo (Chap. IX) ; ROUGET DE L'ISLE, la Marseillaise; ARNAULT, la Feuille; CHATEAUBRIAND, l'Exilé; THÉOPHILE GAUTIER, la Chimère; SULLY PRUDHOMME, le Vase brisé; LA FONTAINE, le Chêne et le Roseau.

ERCKMANN-CHATRIAN, Contes Fantastiques, pp. 3-69, 121-138, ed. by E. S. Joynes, (Holt & Co.).

Two papers will be set: (1) Prescribed texts and translation at sight; questions on Grammar; (2) the translation of English into French.

GERMAN.

The candidate's knowledge of German will be tested by: (1) simple questions on Grammar, (2) the translation of simple passages from English into German, (3) translation at sight of easy passages from modern German, and (4) an examination on the following texts:

1904: GRIMM, Rotkäppchen; ANDERSEN, Wie's der Alte macht, Das neue Kleid, Venedig, Rothschild, Der Bär; ERTL,Himmelsschlüssel; FROMMEL, Das eiserne Kreuz; BAUMBACH, Nicotiana, Der Goldbaum; HEINE, Lorelei, Du bist wei eine Blume; UHLAND, Schäfer's Sonntagslied, Das Schloss am Meer; CHAMISSO, Das Schloss Boncourt; CLAUDIUS, Die Sterne, Der Riese Goliath; GOETHE, Mignon, Erlkönig, Der Sänger; SCHILLER, Der Jüngling am Bache.

BAUMBACH, Waldnovellen.

1905: GRIMM, Rotkäppchen; ANDERSEN, Wie's der Alte macht, Das neue Kleid, Venedig, Rothschild, Der Bär; ERTL,Himmelsschüssel; FROMMEL, Das eiserne Kreuz; BAUMBACH, Nicotiana, Der Goldbaum; HEINE, Lorelei, Du bist wie eine Blume; UHLAND, Schäfer's Sonntagslied, Das Schloss am Meer; CHAM-

ISSO, Das Schloss Boncourt; CLAUDIUS, Die Sterne, Der Riese Goliath; GOETHE, Mignon, Erlkönig, Der Sänger; SCHILLER, Der Jüngling am Bache.

LEANDER, Träumereien, pp. 45-90, (selected by Van Daell).

Two papers will be set: (1) Prescribed texts and translations at sight; questions on Grammar; (2) the translation of English into German.

ENGLISH.

Composition.—An Essay, to which special importance will be attached on one of several themes set by the examiners. In order to pass in this subject, legible writing, correct spelling and punctuation, and proper construction of sentences are indispensable. The candidate should also give attention to the structure of the whole essay, the effective ordering of thought, and the accurate employment of a good English vocabulary. About two pages of foolscap is suggested as the proper length for the essay; but quality, not quantity, will be mainly regarded.

One examination paper.

Literature.—Such questions only shall be set as may serve to test the candidate's familiarity with, and intelligent and appreciative comprehension of, the prescribed texts. The candidate will be expected to have memorized some of the finest passages. In addition to questions on the following selections, others shall be set on a "sight passage" to test the candidate's ability to interpret literature for himself.

One examination paper.

1904.

TENNYSON: Lady of Shalott, Lotus Eaters, Oenone, The Epic and Morte d'Arthur, Ulysses, "You ask me why," "Of old sat Freedom," "Love thou thy land," St. Agnes' Eve, "Break, break, break," Sir Galahad, "Tears, idle tears," and the six interlude songs from The Princess, The Brook, Ode on the Duke of Wellington, Charge of the Light Brigade.

SHAKESPEARE, Julius Cæsar.

1905.

LONGFELLOW: Evangeline, "The Day is Done," The Old Clock on the Stairs, The Fire of Driftwood, Resignation, The Warden of the Cinque Ports, The Bridge, A Gleam of Sunshine.

WORDSWORTH: "Three Years She Grew in Sun and Shade," "She was a Phantom of Delight," "There is a Flower, the Lesser Celandine," "Ethereal Minstrel, Pilgrim of the Sky" "The Green Linnet," To the Cuckoo, "With Little Here to do or see."

SHAKESPEARE: Macbeth.

ANCIENT HISTORY.

1. General outlines of Greek History to the fall of Corinth.

2. General outlines of Roman History to the death of Augustus.

Geography relating to the history prescribed.

One examination paper.

CHEMISTRY.

Properties of Hydrogen, Chlorine, Oxygen, Sulphur, Nitrogen, Carbon and their more important compounds. Nomenclature. Laws of combination of the elements. The Atomic Theory and Molecular Theory.

One examination paper.

SCHOLARSHIPS AND PRIZES.

EXHIBITION OF 1851 SCIENCE RESEARCH SCHOLARSHIP.

This scholarship of the annual value of £150 stg. is awarded by Her Majesty's Commissioners for the Exhibition of 1851 to students who have given evidence of capacity for original research, and (except in very special circumstances) are under 30 years of age.

The nominee must be a British subject, must have been a *bona fide* student of this University for three years, must have been a student of this University for a full year immediately before his nomination, must be a student of this University at the time of his nomination, (or he must have been a student at this University for a full year ending within twelve months prior to his nomination and since ceasing to be such student must have been engaged solely in scientific study) and must pledge himself not to hold any position of emolument whilst holding the scholarship. He is recommended to the Commissioners by the Senate of the University. The scholarship may be held for a second year, if the report of the first year's work be satisfactory to the Commissioners. The scholar will, in the absence of special circumstances, be required to proceed to an institution other than that by which he is nominated, and there pursue some investigation likely to promote technical industries or scientific culture. The particular investigation the student proposes to pursue must be stated before a scholarship can be awarded.

The next recommendation will be made by the Senate in April, 1905.

Science Research Scholars recommended by Queen's University :—

Norman R. Carmichael, M.A., 1894-95.

Thomas L. Walker, M.A., 1896-7.

Frederick J. Pope, M.A., 1898-9.

Wm. C. Baker. M. A., 1900-1.

C. W. Dickson, M.A., 1901-2.

THE BRUCE CARRUTHERS SCHOLARSHIPS.—The following are the conditions upon which these scholarships (two, of the value of $100 each), are awarded and held.

1. The candidates must have sufficient practical kuowledge to give efficient help in the mining laboratory and in assaying. It is particularly required that they be acquainted with amalgamating.

2. The candidates must have entered upon, or be prepared to enter upon, or have finished, one of the courses of study as at page 23, and preference will be given to the students who stand highest in the third year examinations.

3. It is understood that these duties are to be so arranged as to interfere as little as possible with the studies of the scholars.

4. The scholarships may be held for more than one session.

5. Applications will be received up to April 1st.

THE CHANCELLOR'S PRACTICAL SCIENCE SCHOLARSHIP.—Value $70. Given by Sir Sandford Fleming, C.E., K.C.M. G., LL.D., Chancellor of the University. Awarded to the Practical Science student passing the best examination at the end of the first year. This scholarship is open to students of the Mining School.

SCHOLARSHIP IN CHEMISTRY.—This Scholarship of the value of $50, the gift of a graduate, is open to all who have not yet begun the honour course in chemistry. The holder must enter upon and complete the honour course in chemistry (see Calendar of Queen's University). The next examination will be held in April, 1904, on the syllabus of the Senior Chemistry class.

QUEBEC MINING ASSOCIATION PRIZES.—Two prizes of $35 and $15 offered by the General Mining Association of the Province of Quebec will be open for competition to students from McGill University, Toronto University and Queen's University, and will be awarded to the two students presenting the best Summer Thesis on some subject connected with mining. Preference will be given to those Theses which show decided originality.

EXAMINATIONS, FEES, ETC.

EXAMINATIONS.—All examinations are held by Queen's University, and candidates must make application on forms supplied by the Registrar. Examination fees must be paid to the Registrar of the University not later than March 31st for the April examinations, and September 1st for the supplemental examinations.

GRADUATION.—Diplomas for the three years' course are given by the School of Mining, and applications for same must be made to the Secretary, in writing, and the fees paid before April 1st. Candidates for degrees must make application and pay the fees to the Registrar of the University. If a candidate fails in his examinations the graduation fee will be returned.

EXTRA-MURAL STUDENTS.—Students who are not able to attend the School may register in the classes of Junior English, Junior and Senior Chemistry, Elementary Mineralogy and Geology. Tutors are appointed to assist them by correspondence.

FEES.—Registration and Class fees must be paid annually on or before October 10th, and Laboratory Fees before students begin work in the laboratories. Examination, degree graduation, *ad eundum statum*, and University registration fees are payable to the University Registrar. All other fees are payable to the Treasurer of the School of Mining.

Registration for Practical Science Students	$10 00
" for Arts and Medical Students	1 00
Engineering Society..........................	1 00
Athletics	2 00

FEES FOR A COURSE.

These fees cover all class and laboratory fees for the course.

First Year	$45 00
Second Year	45 00
Third Year	50 00
Fourth Year	55 00

FEES FOR SINGLE CLASSES, &C.

These are not additional to the year fees.

Junior and Senior Chemistry, each	$12 00
Any other Course of Lectures	8 00
Drawing	9 00
Surveying, per Session	10 00
Assaying Laboratory, per Session	5 00
Chemical Laboratory, per Session	20 00
Petrographical Laboratory, per Session	5 00
Mechanical and Engineering Laboratory, per Ses.	20 00

GRADUATION AND OTHER FEES.

Graduation B.Sc.	$20 00
" Diploma, three years' Course	10 00
Admission *ad eundum statum*	10 00
*Annual Examination Fee	8 00
Tutor's Fee (Extra-mural Students), one subject	5 00
" " " " more than one subject	10 00

*Students who have paid the April examination fee can write on the September examinations on payment of $4.00.

DEPOSITS.—Each student is required to make a deposit of $5.00 each session. At the close of the session the balance of the deposit remaining after deductions for loss and breakage of apparatus, &c., is returned.

Course D provides for the education of a class of engineers of growing importance. Owing to the wide-spread use in chemical manufactures of mechanical and electrical processes on a large scale, managers of such works must be acquainted not only with chemistry but also with this kind of engineering.

COURSES OF STUDY.

The following courses are offered:

I. Four years' courses for the degree of Bachelor of Science (B.Sc.) in

(A) Mining Engineering.
(B) Chemistry and Mineralogy
(C) Mineralogy and Geology.
(D) Chemical Engineering.
(E) Civil Engineering.
(F) Mechanical Engineering.
(G) Electrical Engineering.
(H) Biology and Public Health.

The degree of Mining Engineer or Engineer of Mines (E.M) is also conferred. (See page 24.)

II. Three years' courses for a diploma:

(A) Mining Engineering.
(B) Analytical Chemistry and Assaying.

III. B.A. and M.A. courses in Chemistry, Assaying, Mineralogy, Geology, &c. (See Calendar of Queen's University, pages 51, 54 and 57.)

IV. Post-graduate courses for the degree of Doctor of Science (D.Sc). For further information see the Calendar of Queen's University, page 105.)

A.—MINING ENGINEERING.

The Diploma in Mining Engineering or in Civil Engineering of the School of Mining, Kingston, is equivalent to the "diploma as civil engineer" mentioned in clause III. of the Dominion Lands Act; so that a candidate for D.L.S. having that diploma from the School of Mining is entitled to examination after one year's service with a D.L.S.

The Ontario Land Surveyors' Act has been amended as follows:

Section 28 of *The Ontario Land Surveyors' Act* is amended by inserting after the word "engineering," at the end of the fifth line thereof the words, "or the School of Mining, Kingston, in civil engineering or in mining engineering."

The letters (*a*) and (*b*) denote first and second term respectively. The numbers in brackets are the hours per week.

FIRST YEAR.

	PAGE
Mathematics, I. (8)	41
Junior English (4)	43
Physics, I. (5)	44
Junior Chemistry (3)	45
Drawing, I. (5)	87
Elementary Mineralogy and Blowpipe Analysis (3)	55
Workshop, I. (5)	44
Descriptive Astronomy (*b*) (1)	44
Junior French (optional). See Arts Calendar	64
Junior German (optional) " "	62

SECOND YEAR.

Mathematics, II. (6)	44
Physics, II. (4)	45
Senior Chemistry (2)	47
Qualitative Analysis (5)	47
Optical Mineralogy (*b*) (2)	60
Geology, I. (3)	61
General Engineering, I. (2)	79
Descriptive Geometry (3)	88
Drawing, II. (2)	87
Surveying, I. (3)	88
Workshop, II. (5)	90

THIRD YEAR.

Descriptive and Determinative Mineralogy (5)	60
Quantitative Analysis and Assaying (10)	51
Mining (2)	66
Ore Dressing (2)	73
Metallurgy (2)	73
Surveying, II. (3)	89
General Engineering, II. (2)	80
Electrical Engineering, I. (1)	82
Thermodynamics, I. (2)	78

Mining Option.

Geology II. and Petrography, I. (5) (*a*)	63
Economic Geology, I. (1) (*b*)	64
Quantitative Analysis, I. (5)	51

Metallurgy Option..

Petrography, I. (2) (a)	63
Economic Geology, I. (1) (*b*)	64
Quantitative Analysis and Assaying, I., II. (10)	51

FOURTH YEAR.

Mechanical Engineering, IV. (a) (2)	86
Metallurgy, II. (3)	75

	PAGE
Mechanism, (1)	87
General Engineering, III. (2)	80
Mining Engineering, II. (3)	69
Mining Law	73
Milling, (12)	73

Mining Option.

Econmic Geology, II	65
Designing and Mining Project	73
Mining III	73

Metallurgy Option.

Metallurgy III	75
Metallurgical Laboratory	73
Industrial Chemistry	51
Metallurgical Reading	75

The degree of Bachelor of Science (B. Sc.) is awarded on the completion of this course, and the production of certificates for not less than three months' work in mines or metallurgical works. The degree of Engineer of Mines (E. M.) is awarded in addition, on the production of certificates of not less than one year's experience in actual mining. These certificates must be signed by mine managers, and must state the character of the work done by the candidate.

B. CHEMISTRY AND MINERALOGY.

FIRST YEAR.

Mathematics, I. (8)	43
Junior English (3)	43
Physics, I. (5)	44
Junior Chemistry (3)	45
Drawing, I, (5)	87
Elementary Mineralogy and Blowpipe Analysis (4)	55
Junior French (optional). See Arts Calendar	64
Junior German (optional). " "	62

SECOND YEAR.

Mathematics, II. (6)	44
Physics, II. (4)	45
Senior Chemistry (2)	47
QualitativeAn alysis (15)	47
Systematic Mineralogy (2)	60
Geology, I. (2)	61

THIRD YEAR

	PAGE
Organic Chemistry (*a*) (3)	49
Descriptive and Determinative Mineralogy (5)	60
Geology, II, and Petrography, I. (5)	63
Quantitative Analysis and Assaying (15)	51
Metallurgy (2)	75
Industrial Chemistry, (2)	53
Physical Chemistry, I and II (*b*) (2)	51
Economic Geology, I. (*b*) (1)	64

FOURTH YEAR.

Physical Chemistry, II. (1)	51
Special practice in Chemical Analysis and Assaying to give facility and precision in methods in use in mining, furnace and analytical laboratories (10)	53
An original research in Chemistry or Mineralogy, the results of which must be reported in the form of a thesis on or before April 1st (20).	

C.—MINERALOGY AND GEOLOGY.

FIRST YEAR

Same as B. and Botany and Animal Biology (5).

SECOND YEAR.

Physics, II. (4)	45
Senior Chemistry (2)	47
Qualitative Analysis (15)	47
Systematic Mineralogy (2)	60
Geology, I. (2)	61
Surveying, I. (3)	88

THIRD YEAR.

Descriptive and Determinative Mineralogy (5)	60
Geology, II., and Petrography, I. (5)	63
Quantitative Analysis (15)	51
Topographical Surveying, II.	89
Field Geology (2)	63
Geological Maps and Sections	65
Physical Chemistry, I. (2)	51

FOURTH YEAR.

Geology, III	64
Petrography, II	64
Economic Geology, I	64
Chemical, Mineralogical and Petrographical examination of selected Rocks and Minerals	65
Original Research. Thesis (20).	

D.—CHEMICAL ENGINEERING.

First Year.

	PAGE
Junior English (4)	43
Mathematics, I. (8)	43
Physics, I. (5)	44
Junior Chemistry (3)	45
Elementary Mineralogy and Blowpipe Analysis (3)	55
Drawing, I. (5)	87
Workshop, I. (5)	90
Descriptive Astronomy (*b*) (1)	44
Junior French and German (optional). See Arts Calendar.	

Second Year.

Mathematics, II. (8)	44
Physics, II. (4)	45
Senior Chemistry (2)	47
Qualitative Analysis, I. (5)	47
General Engineering, I. (2)	79
Surveying, I. (3)	88
Drawing, II. (5)	89
Descriptive Geometry (3)	88
Workshop, II. (5)	90

Third Year.

Mechanism (1)	87
Qualitative Analysis, II. (*a*) (10)	47
Quantitative Analysis, I. and II. (*b*) (10)	51
Organic Chemistry (General) (*a*) (3) and Special (*b*) (3)	49
Metallurgy, I. (2)	53
Industrial Chemistry, I. (*a*, 2)	53
Mechanical Engineering, I., II. and III. (10)	86
Electrical Engineering, I. (1)	82
Physical Chemistry, I. (*b*) (2)	51

Fourth Year.

Physical Chemistry, II. (1)	51
Industrial Chemistry, II. (*b*) (2)	53
Mechanical Engineering, IV. (2)	86
Electrometallurgy (1)	75
Metallurgy, II. (2)	75
Economics (3). See Arts Calendar.	
Chemical Works and Engineering (5)	49
Mining Laboratory (5)	77
Assaying (*b*) (5)	51
Thermodynamics (2)	78

E.—CIVIL ENGINEERING.

FIRST YEAR.

	PAGE
Mathematics, I. (8)	43
Junior English (4)	43
Physics, I. (5)	44
Junior Chemistry (3)	45
Drawing, I. (5)	87
Descriptive Astronomy (1) *(b)*	44
Workshop, I. (5)	90

SECOND YEAR.

Mathematics, II. (6)	44
Physics. II. (4)	45
Senior Chemistry (2)	47
Descriptive Geometry (3)	88
General Engineering, I. (2)	79
Surveying, I. (3)	88
Mapping, I. (6)	88
Workshop, II. (5)	90

THIRD YEAR.

General Engineering, II. (3)	80
Thermodynamics, I. (2)	78
Surveying, II. (3)	89
Geology I. (3)	61
Mapping, II. (6)	88
Railroad Construction (3)	82
Civil Engineering, I	81
Electrical Engineering, I. (1)	82

FOURTH YEAR.

Chemistry of Explosives	53
General Engineering, III. (3)	80
Railroad Engineering (3)	82
Foundations (2)	81
Mechanical Engineering (1) (*a*)	81
Structural Designing (5)	81
Municipal Engineering (3)	81

F.—MECHANICAL ENGINEERING.

FIRST YEAR

Mathematics, I. (8)	43
Junior English (4)	43

	PAGE
Physics, I. (5)	44
Junior Chemistry (3)	45
Drawing, I. (5)	87
Descriptive Astronomy (1) (*b*)	44
Workshop, I. (5)	90

SECOND YEAR.

Mathematics. II. (6)	44
Physics, II. (4)	45
Senior Chemistry (2)	47
Descriptive Geometry (3)	88
General Engineering, I. (2)	79
Mechanical Drawing (6)	86
Workshop, II. (5)	90

THIRD YEAR.

General Engineering, II. (3)	80
Thermodynamics, I, (4)	78
Mechanical Engineering, I., II., III. (10)	81
Qualitative Analysis of Metals and Alloys (5)	47
Electrical Engineering (1)	82
Workshop, III. (5)	90
Metallurgy, I. (2)	73

FOURTH YEAR.

General Engineering, I., II. (2)	79
Thermodynamics, II. (7)	78
Mechanical Engineering, IV., V. (13)	86
Mechanism (1)	87
Workshop, IV. (15)	90
Metallurgy, II. (2)	75

G.—ELECTRICAL ENGINEERING.

FIRST YEAR.

Mathematics, I. (8)	43
Junior English (4)	43
Physics, I. (5)	44
Junior Chemistry (3)	45
Drawing, I. (5)	87
Descriptive Astronomy (1) (*b*)	44
Workshop, I. (5)	90

SECOND YEAR.

Mathematics, II. (6)	44
Physics, II., III. (6)	45
Senior Chemistry (2)	47
Descriptive Geometry (3)	88

	PAGE
General Engineering, I. (2)	79
Mechanical Drawing (6)	86
Workshop, II. (5)	90

THIRD YEAR.

General Engineering, II. (3)	80
Thermodynamics, I. (2)	78
Mechanical Engineering, I., II., III. (10)	81
Physical Chemistry, I. (2)	51
Electrical Engineering, I., II	82
Physics, IV. (6)	45
Workshop, III. (5)	90

FOURTH YEAR.

General Engineering, III. (2)	80
Thermodynamics, II. (2½)	78
Mechanical Engineering, IV. (2)	81
Electrical Engineering, III., IV., V. (10)	82
Physical Chemistry, II.	51
Electrometallurgy I. (1)	75
Mechanism, I	87
Workshop, IV. (5)	90

H.—BIOLOGY AND PUBLIC HEALTH LEADING TO THE DEGREE OF B. Sc.

The course is intended to cover four years in Science and two in Medicine, or six years in all, and will lead to the degrees of B. Sc. and M.D.

FIRST YEAR.—Fee $55.00.

	PAGE
Mathematics, I.. including Descriptive Astronomy (8)	43
Junior English (3)	43
Physics, I. (5)	44
Junior Chemistry (3)	45
Botany (3)	65
Drawing (5)	87

SECOND YEAR.—Fee $55.00.

Senior Chemistry (2)	47
Qualitative Analysis, including Urinalysis (10)	47
Animal Biology (3)	66
Elementary Geology (3)	61
Botany of Algæ and Moulds (1)	65
Bacteriology (3).	

THIRD YEAR.—Fee $60.00.

	PAGE
Comparative Anatomy (12)......	(See Medical Calendar.)
Physiology and Histology.... (12).....	(See Medical Calendar.)
Quantitative Analysis (water, air, food) (5)	51
Surveying, I. (3)............	88
General Engineering, I. (2)..........................	79

FOURTH YEAR.—Fee $65.00.

Human and Comparative Anatomy (10) ...	(See Medical Calendar.)
Physiology and Histology (7).............	(See Medical Calendar.)
Pathology (3)...........................	(See Medical Calendar.)
Sanitary Science (2)...................... Heredity, Imbecility, Insanity, Criminology	(2) (See Med. C'l'd'r.)

Students taking this course and intending to study Medicine are advised to register in the Faculty of Medicine not later than the second session. Such students will pay the regular fees in Science as indicated above.

If a student desires to complete the first two years of his medical course by the end of his fourth year in Science, he must take, in addition to the subjects of his third or fourth year in Science, the following subjects of the medical course: Human Anatomy, Materia Medica, Pharmacy. The medical curriculum may then be completed in two years.

HONOUR COURSES IN QUEEN'S UNIVERSITY IN CHEMISTRY MINERALOGY AND GEOLOGY.

The degree of M. A. will be conferred on students who take Pass standing in the Pass classes, and first class honours in the Honour classes, in any one of the following courses.

The degree of B. A. will be conferred on candidates who take Pass standing in the Pass classes, and second or third class honours in the Honour classes of any one of the following courses.

PASS CLASSES.

Junior English Senior English Junior Mathematics Senior Mathematics Junior Philosophy. Junior Physics. Senior Physics. Junior Chemistry. Senior Chemistry.	Nine.

Junior Latin.
Senior Latin.
Junior Greek.
Senior Greek.
Junior French.
Senior French.
Junior German.
Senior German.
Senior Philosophy.

Any two.

HONOUR CLASSES.

Preliminary and Final Honour Chemistry.
Preliminary and Final Honour Geology.
Preliminary and Final Honour Mineralogy.

Any two.

Specialists' Courses.

By agreement with the Education Department, candidates taking either the M.A. or B.A. Degree under any one of the following Honour courses will receive the non-professional qualification of Specialist in Science.

Pass Classes.

Junior Latin.
Junior French, German or Greek.
Jnnior and Senior English.
Junior and Senior Mathematics.
Junior and Senior Physics (Laboratory Practice in both).
Junior and Senior Chemistry.
Botany.
Animal Biology.
Mineralogy.
Geology.

Honour Classes.

Preliminary Honour Chemistry.
Preliminary Honour Botany.
Preliminary Honour Animal Biology.

Together with any one of the following groups :

(*a*) Final Honour Botany and Final Honour Animal Biology.
(*b*) Experimental Honour Physics and Final Honour Chemistry.
(*c*) Final Honour Chemistry and Preliminary and Final Honour Mineralogy.
(*d*) Preliminary Honour Mineralogy and Preliminary and Final Honour Geology.

Students intending to teach in Ontario are referred to the Calendar of the Ontario Normal College for information regarding Professional Examinations.

By a regulation of the Education Department, any person who has spent two years as a registered student in post-graduate work at Queen's, may write at the final examination of the Ontario Normal College without attendance.

SIX YEARS' COURSES, B.A. AND B.Sc.

A. MINING ENGINEERING.

FIRST YEAR.

Junior Latin,
Junior Greek,
Junior French,
Junior German,
} Any two.

Junior English,
Mathematics, I.
Physics, I.

SECOND YEAR.

Senior English,
Junior Chemistry.

Mathematics, II.
Physics, II.

Junior Philosophy,
Senior Latin,
Senior Greek.
Senior French,
Senior German,
} Any one.

THIRD YEAR.

Junior Political Economy,
Junior History.
} Any one.

Workshop, I.
Drawing, I.

Senior Chemistry,
Pass Mineralogy,
Surveying, I.

FOURTH YEAR.

Geology, I.
Preliminary Honour Chemistry.
Preliminary Honour Mineralogy

General Engineering, I.
Drawing, II.
Workshop, II.

FIFTH YEAR.

Mechanism,
Mineralogy, Descriptive & Det.
Geology, II & Petrography, I.
Quantitative Analysis & Assaying
Mining, - - Economic Geology.

Ore Dressing,
Metallurgy,
Surveying, II.
General Engineering, II.
Electrical Engineering, I.
Thermodynamics, I.

SIXTH YEAR.

Mechanical Engineering, II.
Metallurgy, II.
General Engineering, III.
Surveying, III.

Industrial Chemistry,
Mining Engineering,
Milling,
Mining Law.

D. CHEMICAL ENGINEERING.

FIRST YEAR.

Junior Latin,
Junior Greek,
Junior French,
Junior German,
} Any two.

Junior English,
Mathematics, I.
Physics, I.

SECOND YEAR.

Senior English,
Junior Chemistry.

Physics, II.
Mathematics. II.

Junior Philosophy,
Senior Latin,
Senior Greek.
Senior French,
Senior German,
} Any one.

THIRD YEAR.

Junior Political Economy,
Junior History.
} Any one.

Senior Chemistry,
Surveying, I.

Workshop, I.
Drawing & Descri've Geometry.
Pass Mineralogy.

FOURTH YEAR.

Senior Political Economy,
Senior Philosophy,
Preliminary Honour Latin,
Preliminary Honour French,
Preliminary Hon'r German,
Intermediate Hon'r English.
} Any one.

Qualitative Analysis,
Workshop, II.
General Engineering, I.

Mechanism,
Drawing, II.

FIFTH YEAR.

Qualitative Analysis, II.
Quantitative Analysis, I & II.
Organic Chemistry.

Metallurgy, I.
Industrial Chemistry,
Mechanical Engineer'g, I, II & III.

Electrical Engineering, I.
Physical Chemistry, I.

SIXTH YEAR.

Physical Chemistry, II.
Industrial Chemistry, II.
Mechanical Engineering, IV.

Electrometallurgy,
Metallurgy, II.
Economics.

Chemical Works, &c.
Mining Laboratory.
Assaying.
Thermodynamics.

E. CIVIL ENGINEERING.

FIRST YEAR.

Junior Latin,
Junior Greek,
Junior French,
Junior German.
} Any two.

Junior English,
Mathematics, I.
Physics, I.

SECOND YEAR.

Senior English,
Junior Chemistry.

Physics, II.
Mathematics, II.

Junior Philosophy,
Senior Latin,
Senior Greek,
Senior French,
Senior German,
} Any one.

THIRD YEAR.

Junior Political Economy,
Junior History,
} Any one.

Workshop, I.
Drawing, I.

Senior Chemistry,
Pass Mineralogy,
Surveying, I.

FOURTH YEAR.

Geology, I.
Drawing, II.

Workshop, II.
Descriptive Geometry.

Senior Political Economy,
Senior Philosophy, [redacted]
Preliminary Honour Latin,
Preliminary Honour French,
Preliminary Hon'r German,
Intermediate Hon'r English,
} Any one.
Mapping, I.
General Engineering, I.
Mechanism.

FIFTH YEAR.

General Engineering, II.
Thermodynamics.
Surveying, II.

Mapping, II.
Railway Construction.
[redacted]
Civil Engineering, I.
Electrical Engineering, I.

SIXTH YEAR.

Chemistry of Explosives,
General Engineering, III.
Railway Engineering.

Foundations,
Mechanical Engineering.

Structural Designing,
Municipal Engineering.

F. MECHANICAL ENGINEERING.

FIRST YEAR.

Junior Latin,
Junior Greek.
Junior French,
Junior German,
} Any two.

Junior English,
Mathematics, I.
Physics, I.

SECOND YEAR.

Junior Philosophy,
Senior Latin,
Senior Greek.
Senior French,
Senior German,
} Any one.

Mathematics, II.
Senior English,
Junior Chemistry.

Physics, II.

Third Year.

Junior Political Economy,
Junior History.
Any one.

Workshop, I.
Drawing, I.

Senior Chemistry,
Pass Mineralogy,
Surveying, I.

Fourth Year.

Mechanical Drawing,
Descriptive Geometry.

Descriptive Astronomy,
General Engineering, I.
Mechanism.

Workshop, II.

Senior Political Economy,
Senior Philosophy,
Preliminary Honour Latin,
Preliminary Honour French,
Preliminary Hon'r German,
Intermediate Hon'r English.
Any one.

Fifth Year.

General Engineering, II.
Thermodynamics, I.

Mechanical Engineeri'g, I, II, III.
Quantitative Analysis of Metals.

Electrical Engineering,
Workshop, III.
Metallurgy, I.

Sixth Year.

Mechanical Engineering, IV, V.
Workshop, IV.
Metallurgy, II.

General Engineering, I, II
Thermodynamics, II.
Mechanism.

G. ELECTRICAL ENGINEERING.

First Year.

Junior Latin,
Junior Greek,
Junior French,
Junior German,
Any two.

Junior English,
Mathematics, I.
Physics, I.

Second Year.

Senior English,
Junior Chemistry.

Physics, II.
Mathematics, II.

Junior Philosophy,
Senior Latin
Senior Greek,
Senior French,
Senior German,
Any one.

Third Year.

Junior Political Economy,
Junior History.
Any one.

Workshop, I.
Drawing, I.

Senior Chemistry,
Pass Mineralogy,
Surveying, I.

FOURTH YEAR.

Mechanical Drawing,
Descriptive Geometry,
Mechanism.

Workshop, II.
General Engineering, I.

Senior Political Economy,
Senior Philosophy.
Preliminary Honour Latin,
Preliminary Honour French,
Preliminary Hon'r German,
Intermediate Hon'r English.
Any one.

FIFTH YEAR.

General Engineering, II.
Thermodynamics, I.

Mechanical Engineering, I, II, III.
Physical Chemistry, I.

Electrical Engineering, I, II.
Physics, IV.
Workshop, III.

SIXTH YEAR.

General Engineering, III.
Thermodynamics, II
Mechanical Engineering, IV.

Electrical Engineering, III, IV, V.
Physical Chemistry, II.

Electrometallurgy,
Workshop, IV.

SUBJECTS OF STUDY.

ENGLISH LANGUAGE AND LITERATURE.

PROFESSOR—James Cappon, M.A.
ASSISTANT-PROFESSOR—John Marshall, M.A.
TUTOR—Lilian Vaux.

JUNIOR CLASS.

1. Practical course in Rhetoric and Composition.
2. Analysis of style in connection with the study of passages from Bacon, Addison, Johnson, Washington Irving, Macaulay, Ruskin, Carlyle, Burroughs.

Bacon's Essays (Of Truth, of Studies). (Maynard, Merrill & Co.. New York.)

Irving's Sketch-Book (Visit to Shakespeare's Birthplace, Rip Van Winkle). (Maynard, Merrill & Co.)

Macaulay's Essay on Boswell's Johnson. (Maynard, Merrill & Co.)

John Burroughs, Bees (Baldwin's Specimens of Prose Description. Henry Holt & Co., New York).

Carlyle, The Storming of the Bastille (Baldwin's Specimens).

3. A detailed study (in class) of the following :

Chaucer, Prologue to Canterbury Tales. (The descriptions of the Knight, Squire, Prioress, Monk, Friar Student, Merchant, Franklin, Doctor, Shipman, Parson).

Shakespeare, The Merchant of Venice.

Longfellow, Prelude, Nuremberg, The Belfry of Bruges, The Skeleton in Armour, Amalfi, The Village Blacksmith, The Day is Done, The Secret of the Sea.

Tennyson, The Palace of Art, The Lady of Shalott, "Love Thou Thy Land," The Lord of Burleigh, Recollections of the Arabian Nights, Sir Galahad, Aylmer's Field.

MATHEMATICS.

Professor : N. F. DUPIUS, M. A., F. R. S.C.
Assistant Professor : J. MATHESON, M. A.
Lecturer : F. R. SHARPE, B. A.

MATHEMATICS I.

This class will meet for the study of mathematics eight hours per week, of which one hour per week during the second term will be given to astronomy. The subjects of study are as follows : (1) Algebra, including the leading parts of the subject such as multiplication, division, expansion into series, fractions, indices and surds, proportions, graphing of functions, quadratic ; together with permutations and combinations, binomial theorem, undetermined co-efficients, summation of series, continued fractions, logarithms, expotentials, etc., three hours per week.

(2) Geometry, Elementary Geometry, including the first three parts of Dupuis' plane geometry, together with the first 131 pages of Dupius' solid geometry. Three hours per week. Particular attention will be given to practical applications of geometric principles.

(3) Trigonometry, including the fundamental principles and formulae with numerous exercises and applications. A great portion of the practical work will be done by means of natural functions. Nature and use of logarithms and tables, inverse functions and the first principles of spherical trigonometry. One and a half hours per week.

(4) Elements of descriptive astronomy, illustrated by diagrams and models. One half hour per week.

In all these subjects numerous exercises will be required.

MATHEMATICS II.

This class will meet for the study of mathematics six hours per week, and the subjects taken up will be as follows :

(1) Spherical Trigometry and Geodesy, with general theories of projection and perspective. Simple application to spherical astromony.

(2) Co-ordinate Geometry of two and three dimensions with application to the conic sections and some of the more prominent curves.

(3) The Differential and Integral Calculus, with application to curves and curve tracing, graphing, lengths of lines, areas of surfaces, and volume of solids ; centre of inertia, moment of inertia, etc., approximate areas by equidistant ordinates.

PHYSICS.

Professor: D. H. Marshall, M.A., F.R.S.E.
Associate Professor: N. R. Carmichael, M.A.
Demonstrator: W. C. Baker. M.A.

Courses of study for students in the faculty of Arts are described in the Calendar of Queen's University.

The following courses are taken by students in the Faculty of Practical Science.

In all courses the experiments performed in the laboratory must be carefully recorded in suitable note-books which must be handed in for inspection every month. Exercises and problems are given from time to time.

I. Elementary course in General Physics, including the measurement and treatment of physical quantities, dynamics, properties of matter, and two or more of the following subjects, heat, light, sound, electricity and magnetism.

(Lectures three hours per week, experimental work in the laboratory two hours per week.)

Text-Books—Ames' Theory of Physics.

Watson's Elementary Practical Physics.

II. A continuation of Course I, treating principally mechanics, thermodynamics and the experimental subjects not taken in Course I. in the previous session. In session 1903-4, sound and light and certain portions of electricity will be studied.

(Lectures two hours per week, experimental work in the laboratory two hours per week.)

Text-Book—Ames' Theory of Physics.

III. (For students of Electrical Engineering.) Experimental study of certain phenomena of electricity and methods of measuring electrical quantities, with reading of prescribed text. (Two hours per week.)

IV. (For students of Electrical Engineering.) The mathematical theory of electricity and magnetism, and the experimental measurement of electrical quantites. (Lectures one hour per week, experimental work five hours.)

The following books are recommended for consultation in connection with these courses; copies are kept in the reading room where they may be freely consulted by students.

Ganot, *Physics;* Hastings and Beach, *General Physics;* Kelsey, *Physical Determinations;* Stewart and Gee, *Elementary Practical Physics;* Everett, *C.G.S. System of Units;* Lupton, *Numerical Tables;* Balfour Stewart, *Heat;* Sylvanus Thompson, *Elementary Lessons in Electricity and Magnetism;* Ayrton, *Practical Electricity.*

CHEMISTRY.

Professor: WILLIAM L. GOODWIN, D.Sc., Edin.

Lecturer: JOHN WADDELL, B.A., D.Sc., Ph.D.

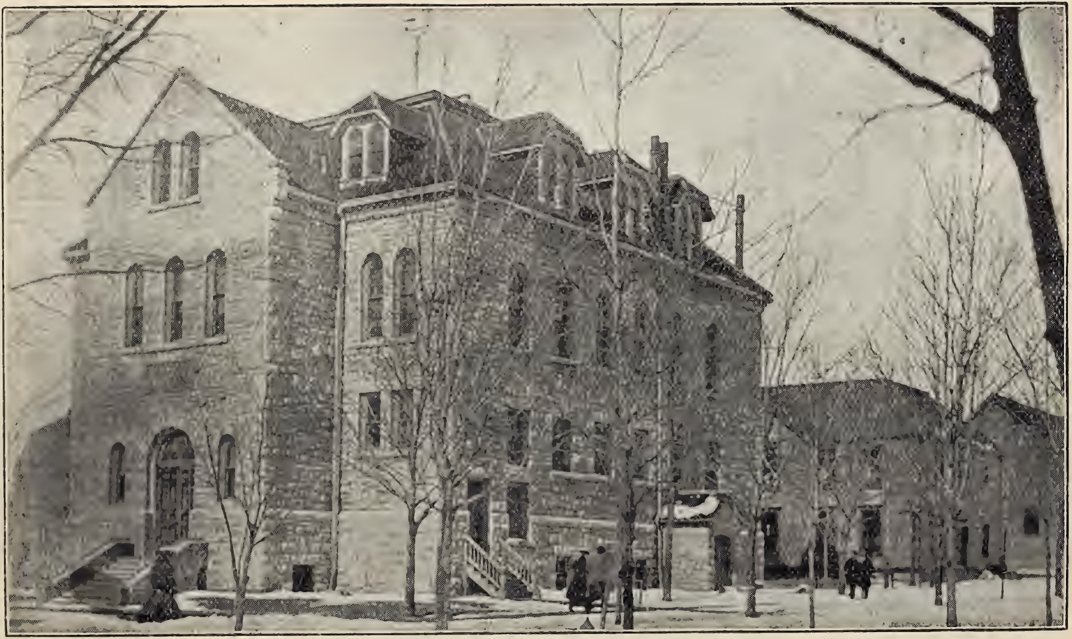
Fellow: W. L. LODGE, M.A.

Demonstrators: J. W. HAZLETT, B.A., W. K. MCNEILL, L. L. BOLTON.

JUNIOR.

1. *Lectures* on the principles of Chemistry as follows:

Monday and Tuesday at 11 a.m.



JOHN CARRUTHERS HALL AND MINING LABORATORIES.

Chemical Species; Crystals and Crystallization; Chemical Change; Laws of Combination; Relation of Heat to Chemical Changes; Notation; Equations; Nomenclature; Volume Relation of Gases in Chemical Change; Volume Formulae; The Atomic Theory; Descriptive Chemistry of the Commoner Elements and their Compounds; Electrolysis; Spectrum Analysis Chemical Calculations.

Text-Books:—Shenstone's Chemistry. (Edward Arnold, London).
Waddell's Arithmetic of Chemistry. (Macmillan & Co., N.Y.)

2. *Laboratory practice*, consisting of simple experiments, by means of which the student may become acquainted with the properties of common substances.

Mondays at 2 p.m.

SENIOR.

Before taking this class students must have passed in Junior Chemistry.

(1st TERM.) 1. *Lectures* on Elementary Organic Chemistry.

2. *Lectures* on the chemistry of the metals, their occurrence in nature, reduction and uses. Thursdays and Fridays at 11 a.m.

3. *Qualitative Analysis.* Notes on systematic qualitative analysis are given in a course of lectures in October.

Students are required to complete the first 25 introductory exercises in Noyes' Qualitative Analysis, and to hand in their note books for inspection. This must be done before beginning the analysis of unknown substances.

(2nd TERM.) *Lectures* on chemical laws and theories. Thursdays and Fridays at 11 a.m.

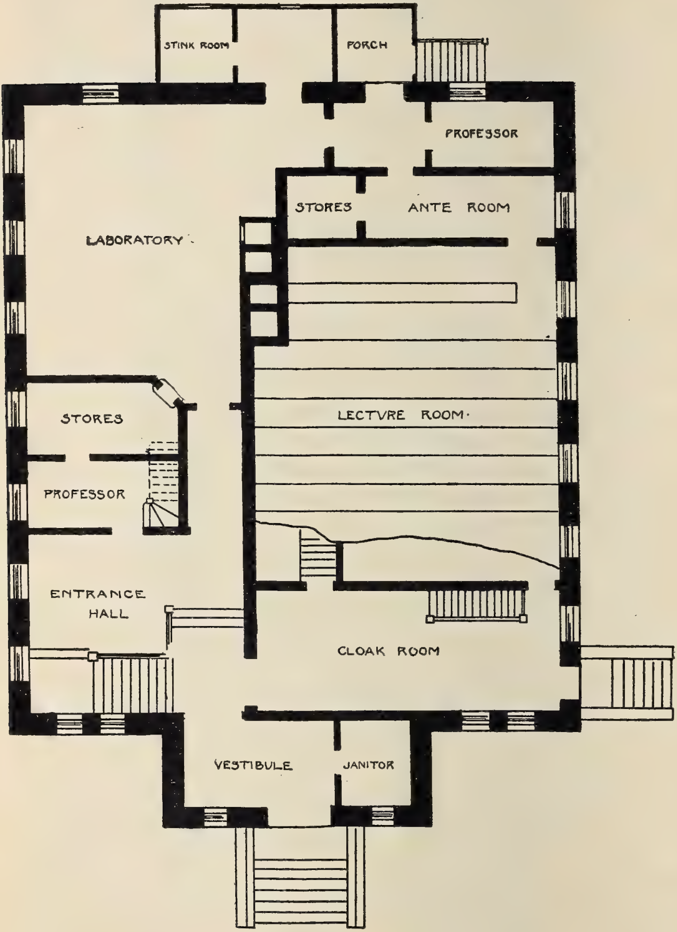
2. *Qualitative Analysis of Minerals.* This work may occupy from two to four hours a day. The practical work in qualitative analysis must be completed to the satisfaction of the instructors. Students are expected to master the theory as they proceed with the practice. A competent knowledge of theory will be required.

Text-Books: Van Deventer's Physical Chemistry. (J. Wiley & Sons, New York.)
Cohen's Theoretical Organic Chemistry. (Macmillan & Co.).
Richter's Inorganic Chemistry. (Chapters on Metals).
Arthur A. Noyes' Qualitative Analysis. (Macmillan & Co.).

Syllabus of Organic Chemistry.

Calculation of Empirical formulae from percentage composition —Determination of molecular weight from vapour density—Isomerism—Constitution of organic compounds—Rational formulae—Homologous series — Radicles — Classification—

CARRVTHERS HALL·
SCHOOL OF MINING KINGSTON ONT·



FIRST FLOOR PLAN

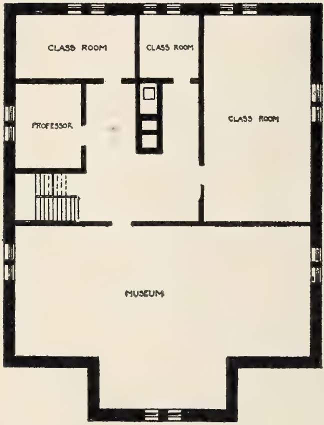
Optically active compounds—*Paraffins,* methods of preparation, properties, nomenclature and isomerism—*Olefines,* methods of preparation and properties—*Acetylene Series—Monatomic saturated alcohols,* properties, methods of preparation and isomerism—Methyl and ethyl alcohols—Ethers, simple and mixed, methods of preparation and properties—Ethyl ether—*Thio-alcohols* and *thio-ethers—Compound ethers* or *esters,* preparation and properties—*Esters of nitrous acid—Nitro paraffins—Sulphonic acids—Cyanides and isocyanides—Amines—Hydrazines—Phosphines — Arsines —Metallic compounds of the alcohol radicles—Aldehydes*—Formic aldehyde—Acetic aldehyde—Chloral and chloral hydrate —*Ketones*—Acetone—*Fatty acids*—Formic acid—Acetic acid —Fats and oils—Soaps—*Hydroxy acids (oxyacids)*—Lactic acid—*Chlorides of the acid radicles—Acid anhydrides—Amides*—Glycol—Glycerine — Nitroglycerine—Oxalic acid—Tartaric acid—Citric acid—*Cyanogen compounds*—Cyanogen —Hydrocyanic acid—Potassium cyanide—*Double cyanides*—Potassium ferrocyanide—Potassium ferricyanide—Halogen compounds of cyanogen—Cyanic acid—Potassium cyanate—Ammonium cyanate—Ethyl isocyanate—Potassium thiocyanate—Ammonium thiocyanate—Ethyl thiocyanate—Allyl isothiocyanate—Urea—Carbamic acid—Ammonium carbamate—Thiocarbonic acids—Thiocarbamide — *Carbohydrates—The grape sugar group—The cane sugar group—The cellulose group*—Grape sugar—Fruit sugar—Cane sugar—Milk sugar—Malt sugar—Cellulose—Starch—Gums—Dextrine — *Benzene Derivatives*—Differences between aromatic and fatty hydrocarbons—Isomeric relations—*Ortho-meta and para-derivatives* —Constitution of benzene—Occurrence of benzene derivatives —*Modes of formation and properties of benzene hydrocarbons*--Benzene—Toluene—Xylenes--Mesitylene--*Halogen substitution products—Nitro-substitution products—Amido-derivatives—Primary monamines*—Aniline —Acetanilide—*Diazo-compounds — Azo-compounds — Hydrazines—Phenols—Monatomic phenols*—Carbolic acid—*Cresols*— Hydroquinone —Pyrogallol—Quinone—*Aromatic alcohols—Aromatic acids* —Benzoic acid—*Phthalic acids*—Petroleum—Wood tar—Coal tar.

The subjects in italics are to be studied not too much in detail, but with a view of observing the relations to each other of the classes of compounds and the commoner general methods of formation.

ADVANCED.

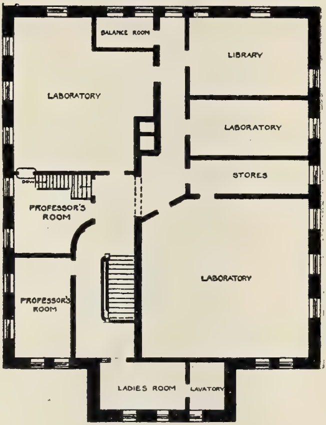
(1st TERM.) 1. *Lectures and Class Work on Organic Chemistry.* The detailed study of selected groups of Carbon Compounds. Special study of Organic Synthesis. Wednesday, Thursday and Friday at 3 p.m.

CARRVTHER'S HALL·
SCHOOL OF MINING KINGSTON ONT·



THIRD FLOOR PLAN

CARRVTHER'S HALL
SCHOOL OF MINING KINGSTON ONT·



SECOND FLOOR PLAN

2. *Lectures on Industrial Chemistry.* Monday at 3 p.m. Tuesday at 2 p.m.

3. *Quantitative Analysis.*

Text-Books: Bolton's Quantitative Analysis (J. Wiley & Sons, New New York.)

Fresenius' Quantitative Analysis.

(2nd TERM.) *Lectures* on selected subjects in *Industrial Chemistry.* Monday at 3 p.m. Tuesday at 2 p.m.

Text-Book: Thorp's Industrial Chemistry (Macmillan & Co., New York.)

2. *Lectures on Physical Chemistry.* (Courses B, C and D.) For the session of 1903–1904 the subjects will be Thermochemistry, Electrochemistry, the Properties of Solutions and the Kinetic Theory of Gases. Wednesday and Friday at 3 p.m.

Text-Book: Walker's Introduction to Physical Chemistry. (Macmillan & Co.)

3. *Quantitative Analysis and Assaying.* The practical work must be completed to the satisfaction of the instructors. Students are expected to master the theory of the operations as they proceed with them, to write out sufficient explanations in standard note books, and to submit their note books for inspection when each analysis is completed.

FOURTH YEAR—COURSE B.

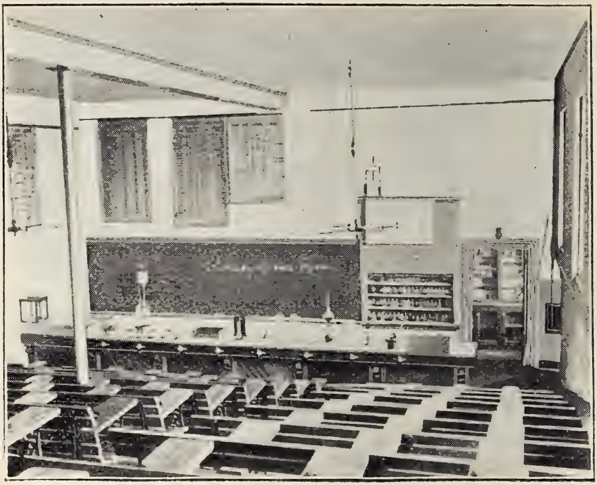
1. *Experimental Work* in some selected field, such as rock analysis, organic analysis, analysis of water, air, foods, fertilizers, soils, etc.

2. *Advanced Physical Chemistry.* Lectures on Tuesday at 10 a.m.

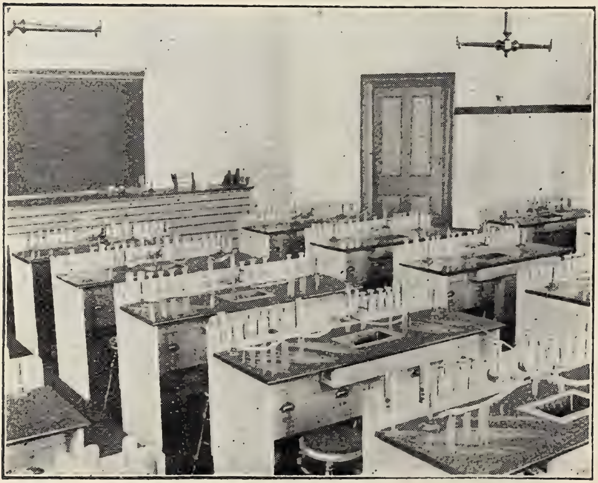
Students are urged to make daily use of the library, reading along the lines of their laboratory work.

Syllabus of Quantitative Analysis and Assaying.

I. 1. Barium Chloride—Ba, Cl, H_2O
2. Calcium Carbonate—CaO, $C\ O_2$
3. An Ammonium Salt—$N\ H_3$
4. A phosphate—$P_2\ O_5$
5. Coal—moisture, volatile matter, fixed carbon, ash
6. Bleaching powder—available chlorine
7. Iron ore—Fe, SiO_2, S
8. Zinc ore—Zn
8. Lead ore Pb
10. Copper ore—Cu by electrolytic and cyanide methods
11. Nickel ore—Ni by electrolytic method
12. Fire assay of Gold and Silver



CHEMISTRY LECTURE ROOM.



LABORATORY NO. 3.

a. Gold in quartz
b. Gold in an oxidised ore
c. Gold in a sulphide ore
  (1) by roasting, (2) by nail assay
d. Silver in pig lead by cupellation
e. Gold and Silver in copper matte
  (1) by pot assay, (2) by scorification

II. 1. Dolomite—SiO_2, Al_2O_3 and Fe_2O_3, CaO, MgO, CO_2
  2. Pig iron—Si, P, Mn

III. 1. Barite—BaO, SrO, SO_3
  2. Bronze—Cu, Sn, Zn
  3. Alkalimetry
  4. Acidmetry
  5. Chromite—Cr_2O_3
  6. Feldspar SiO_2, Al_2O_3, CaO, MgO, K_2O, Na_2O,
  7. Titaniferous iron ore—TiO_2, Fe, SiO_2, S, P, Mn, CaO, MgO
  8. Arsenopyrite—As

I. is for course A, mining option.
I. and II. for course A, metallurgy option.
I. II. and III. for courses B, C and D

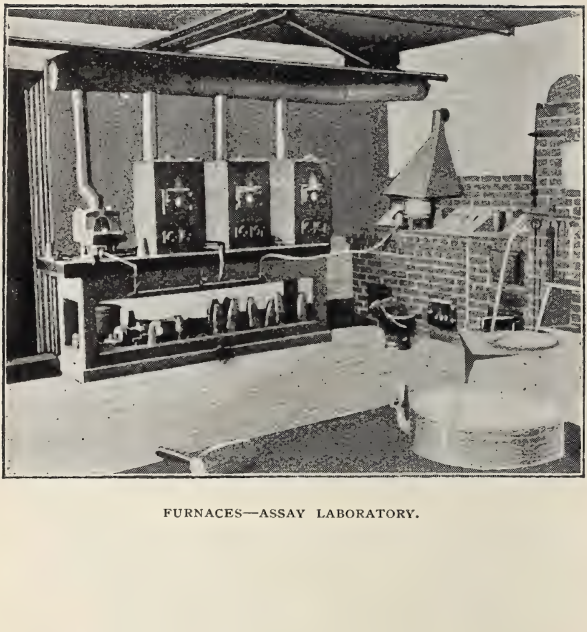
Syllabus of Industrial Chemistry.

I. Lixiviation, Levigation, Evaporation, Distillation, Sublimation, Filtration, Crystallisation, Calcination, Refrigeration, Sulphur, Sulphuric Acid, Salt, Hydrochloric Acid and Sodium Sulphate, Soda, Chlorine, Nitric Acid, Ammonia, Cyanides, Pigments, Petroleum.

I. Fertilisers, Phosphorus, Arsenic, Sulphates, Potash, Glass, Ceramics, Bromine, Iodine, Water, Glass, Peroxides, Oxygen, Carbon Bi-sulphide, Carbon Tetra-Chloride, Manganates and Permanganates, Destructive Distillation of Wood, Illuminating Gas, Coal Tar, Vegetable and Animal Oils, Soap, Candles, Glycerine, Starch, Dextrine and Glucose, Cane Sugar, Fermentation Industries (Bleaching and Dyeing), Paper.

THE CHEMICAL LABORATORIES.

The practical work in chemistry is carried on in three laboratories: No. 1 for qualitative analysis, No. 2 for quantitative analysis, and No. 3 for experimentation in class and drill on the subjects treated of in the junior lectures. No. 1 and No. 2 are fitted up with 62 and 42, respectively, locked work places, so that 104 students can be provided each with a set of apparatus under lock and



FURNACES—ASSAY LABORATORY.

key. These laboratories are open from 8 a.m. to 5 p.m., and students are allowed to carry on their analytical work when not otherwise engaged. The number of hours a day to be spent in the laboratories depends, to some extent on the aptitude of the student for experimentation. The average is about two and a half hours. No. 3 serves both as a laboratory and a class room. It is furnished with seats and desks which are at the same time work tables. Besides these larger laboratories there are smaller rooms devoted to special branches of analytical chemistry and to research.

Each student, before entering any practical class, is required to deposit five dollars with the Secretary. On presenting to the instructor of the class the receipt for this and the class ticket, the student receives the key of his place and a set of apparatus. The deposit is returned at the end of the session, breakages, etc., having been deducted.

All students are required to use the *School of Mining* note books, and to make their reports of analysis written neatly with ink on blanks provided for the purpose.

MINERALOGY.

Professor : William Nicol, M. A.

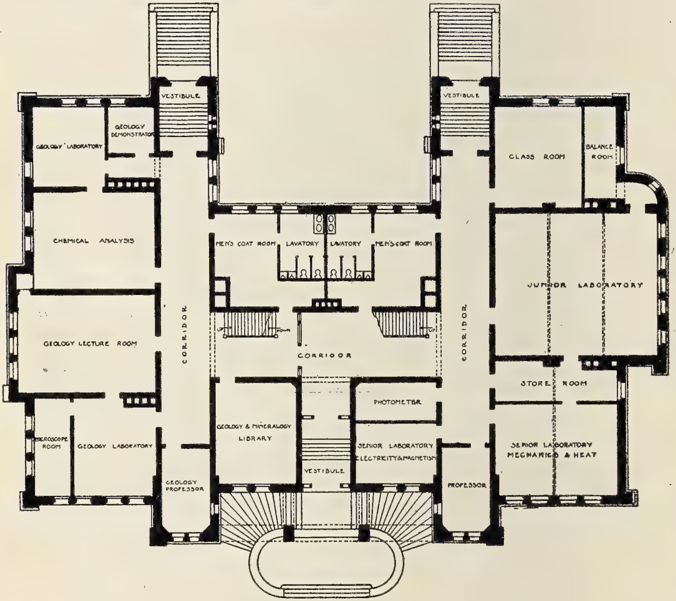
Demonstrator : F. H. MacDougall, M. A.

The work in this department for mining students extends over three years, and is divided into five parts : (*a*) Elementary Mineralogy ; (*b*) Systematic Mineralogy ; (*c*) Optical Mineralogy ; (*d*) Descriptive Mineralogy ; (*e*) Determinative Mineralogy.

(*A*) *Elementary Mineralogy.*

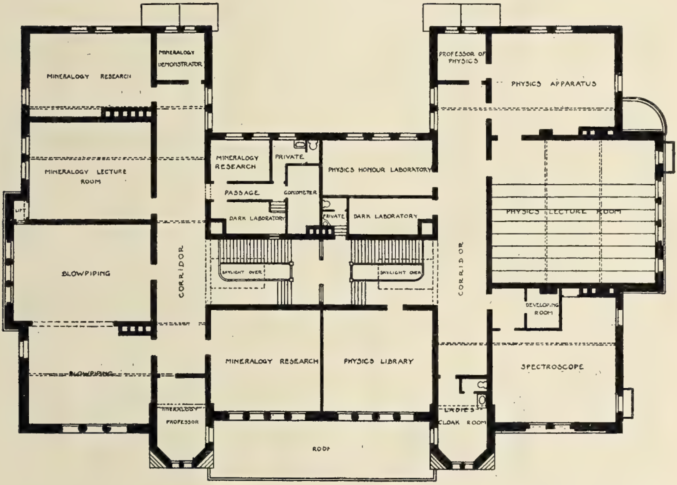
The work in this class is intended as a preparation for those entering upon the studies of geology, petrography and metallurgy. The class should be taken in the first session along with junior chemistry and junior physics, as a knowledge of chemistry and physics is necessary for a proper comprehension of the subject. The regular work consists of (1) a course of about fifteen lectures and demonstrations on crystallography, held at the beginning of the fall term at nine o'clock a.m. on Mondays, Tuesdays, Wednesdays, Thursdays and Fridays ; (2) lectures on the physical, optical and other properties of minerals ; (3) the description of fifty or sixty

PHYSICS, GEOLOGY AND MINERALOGY BUILDING.



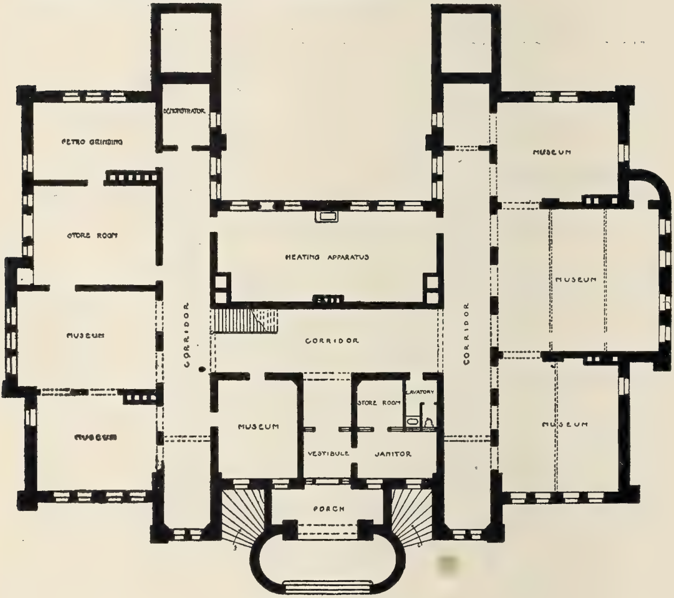
FIRST FLOOR PLAN·

PHYSICS, GEOLOGY AND MINERALOGY BUILDING.



SECOND FLOOR PLAN

PHYSICS, GEOLOGY AND MINERALOGY BUILDING.



GROVND FLOOR PLAN

prominent Canadian minerals, followed by practical work in the determination of these. Each student is supplied for the session with a set of minerals for which he is held responsible. (See under Blowpipe Anallysis.) The practical work of the class is conducted in the mineralogical and blowpipe laboratory, where cabinets containing specimens of commonly occurring minerals are arranged for use. Students are taught to recognize minerals by simple field tests, such as form, colour, streak, hardness, specific gravity, etc. For this work students must provide themselves with a pocket lens, knife, streak-plate and magnet. The regular class meets at 9 a.m. on Mondays, and for review at two other hours per week to suit the members of the class.

Excursions to mineral localities in the vicinity of Kingston are held on the Saturdays of the fall term.

The class meets in the mineralogy lecture room, third flat of the mineralogy, geology building.

Text-Books :—Williams' Crystallography (Henry Holt & Co).
Dana's Minerals and How to Study Them.
Crosby's Tables for the Determination of Minerals.

(*B*) *Systematic Mineralogy.*

Before taking this class, which is intended for those taking courses *B* and C., students must have passed in elementary mineralogy, junior chemistry, and junior physics. The work is preparatory to that in petrography, geology and descriptive mineralogy, which should be taken the session following.

The regular work consists of a course of lectures, two hours per week, dealing with the physical, optical and other properties of minerals, illustrated by specimens from the lecture cabinet, microscopic slides, thin sections, models and charts, supplemented by a course of evening lectures, illustrated by lantern slides, and intended as a review of the work in the day classes. Students taking this class must attend the course of lectures on crystallography delivered early in the fall term, and those intending to do advanced work in mineralogy must attend the lectures on crystallography delivered in connection with first honour mineralogy, during the fall term. Essays on prescribed subjects are required. The class meets at 2 p.m. on Mondays, and 11 a.m. on Wednesdays in the mineralogy lecture room of the mineralogy geology building.

Text-Books :—Dana's Text-book of Mineralogy, 1902. (Wiley & Sons)
Tschermak's *Mineralogie.*
Williams' Crystallography. (Henry Holt & Co).
Miers' Mineralogy.

Books for Reference : Naumann-Zirkel's *Mineralogie.*

(C) Optical Mineralogy.

This class is intended for those students only who are taking Course A—mining engineering. The work is intended to prepare students for taking the classes of petrography and determinative mineralogy, which should be taken the session following. The work consists of the regular classes in systematic mineralogy for the winter term at 2 p.m. on Mondays and 11 a.m. on Wednesdays.

(D) Descriptive Mineralogy.

Before taking this class students must have passed in elementary and systematic mineralogy (or optical mineralogy in the case of students in Course A.) It should be taken along with petrography, economic geology and metallurgy.

The work of this class consists in the exhibition and description of the mineral specimens contained in the museum collection. Special attention is given to ores, gangue minerals, those having a commercial value and those of importance as rock-forming minerals in geology. The specimens are constantly being increased by collection, donation, exchange and purchase, the aim being to make the museum as complete as possible. Dana's *System of Mineralogy* is used as the text-book. No attempt is made to learn the minerals mechanically, the desire being, rather to acquire a practical working knowledge, such as would be useful to the assayer, consulting geologist or mining engineer. The class meets at 8 a.m. on Mondays in the mineralogy lecture room. Attendance compulsory.

(E) Determinative Mineralogy.

Before taking this class students must have passed in elementary mineralogy, blowpipe analysis, and systematic mineralogy, (or optical mineralogy in the case of students in Course A.)

As far as possible the work of this class is carried on parallel with that in descriptive mineralogy, as the pyrognostic characters are of importance in the description of minerals.

The objects of the class are to assist students in acquiring a knowledge of the chemical properties of minerals and to enable them to test and recognize minerals in the field by simple tests such as streak, specific gravity, etc., or more leisurely at home, by means of the blow-pipe and chemical reagents. (See under Blowpipe Analysis.) Attendance compulsary.

Cabinets filled with mineral specimens are provided for use. Students are permitted to handle and examine these, under supervision. The advantage that this class affords to the prospector and field geologist will be at once apparent. On Saturdays, during the fall term, excursions are made to interesting mineral localities. In this way the nucleus of a collection may be secured at a small cost. The class meets at 8.10 a.m. on Wednesdays and at 8 a.m. on

Thursdays and Fridays in the blowpipe laboratory of the Mineralogy Geology Building. Attendance compulsory.

Text-Book :—Crosby's Tables for the Determination of Common Minerals.

BLOWPIPE ANALYSIS.

Professor: WILLIAM NICOL, M.A

Demonstrator : F. H. MACDOUGALL, B.A.

The work in this class for mining students extends over two sessions. It should be taken in the first session along with junior chemistry and junior physics, as an aid to qualitative analysis and systematic mineralogy in the following session.

The blowpipe laboratory is arranged to accomodate forty-eight students. Students must supply their own blowpipe apparatus, but a locker and key are provided for each student. For junior students the class meets in the plowpiping laboratory in the Mineralogy-Geology Building on Friday afternoon, 1-3 o'clock. For senior students the class meets on Wednesdays 8-10 a.m. The work of the fall term in the junior class consists in learning the use of the blowpipe, the various operations and the reagents employed; the winter term is occupied in applying the knowledge acquired during the fall term, in the determination of minerals. The work of the primary class is continued during the third session in connection with the classes of descriptive and determinative mineralogy. The quantitative assay of gold and silver ores, by means of the blowpipe, forms part of the work of the class in assaying.

Text-Books:—Chapman's Blowpipe Practice, 2nd ed. (Copp Clark Co.)

Kolbeck's 6th ed. of Plattner's *Probirkunst mit dem Lothrohre.*

Books for Reference :

Brush and Penfield's Manual of Determinative Mineralogy and Blowpipe Analysis. (Wiley & Sons), 15th ed. 1899.
Endlich's Manual of Qualitative Blowpipe Analysis.
Moses and Parsons' Mineralogy, Crystallography and Blowpipe Analysis, 2nd ed.
Landauer's Blowpipe Analysis.

GEOLOGY.

Professor: WILLET G. MILLER, M. A.

Acting Professor: R. W. BROCK, M. A.

Demonstrator: M. B. BAKER, B. A., B. Sc.

The instruction in this department is adapted to the needs of the prospector, the mining engineer, and the professional geologist. Provision is also made for persons who desire a knowledge of the subject as a part of a general education. Graduates and others who wish to pursue some special line of investigation, or to have the use of the laboratories and apparatus, in order to work up material collected by themselves, will have every facility placed at their disposal.

Students have access to the museum of Queen's University which contains a large number of specimens illustrative of the geology of Canada, as well as to the collections of the school.

Advice concerning field work in geology during the summer vacation will be given by the professor.

Students are advised to procure copies of some of the text-books, and to gain some acquaintance with them during the long vacation, preceding the beginning of the session in October.

Second Year.

GEOLOGY I. A.

Before taking this class students must have passed in elementary mineralogy and in junior chemistry.

The object of this course is to give a general knowledge of the subject as an introduction to the work of the third and fourth years.

The following themes will be treated of in the lectures :—

The planetary relations of the earth ; the atmosphere ; waters; solid crust ; probable nature of the earth's interior ; rocks, their general megascopic and microscopic characters and classification ; volcanic action ; earthquakes ; upheavel ; subsidence ; geological effects produced by heat, air, water, and life ; bosses ; dykes ; veins; stratification ; dip ; strike ; anticline and syncline ; faults, foliation ; nature and uses of fossils ; stratigraphical geology ; outline of the geological history of the globe, etc.

The lectures are illustrated by means of maps, diagrams and lantern views.

The laboratory work will consist of the examination of typical specimens of the different groups of fossil plants and animals, and of hand specimens of the more common rocks.

During the months of October and November excursions will be made to places of geological interest in the vicinity of Kingston. Students are expected to take part in all these excursions. The cost will not exceed five dollars. Each student should provide himself with a suitable hammer, specimen bag and note-book.

Students are required to provide themselves with a copy of W. B. Scott's " An Introduction to Geology" (The Macmillan Co., price $1.90), which is used as a text-book.

Books for Reference :

Kemp's " Hand-book on Rocks," (price $1.50.)

LeConte's Compend of Geology.
Dana's Manual of Geology, (last edition.)
Chapman's Minerals and Geology of Ontario and Quebec.

Third Year.

GEOLOGY II. B.

Before taking this class students must have passed in geology of the second year.

In this course special attention will be given to stratigraphical geology and the geology of Canada. Type fossils of the different formations will be studied.

Text-books and Books for Reference:

Chapman's Minerals and Geology of Ontario and Quebec.
Dawson's Geology of Canada.
Dana's Manual of Geology.
Wood's Elementary Palaeontology.
Geological Survey Reports of Canada.

PETROGRAPHY I. C.

Students must have passed in second year geology and systematic mineralogy.

This course will consist of lectures on the use of the petrographical microscope and accessories in the determination of the rock-forming minerals, together with the determination of some of the more common igneous rocks.

The lectures will be illustrated by means of microscopic projections of thin sections of minerals and rocks, and will be supplemented by a large amount of laboratory work.

A considerable variety of dyke rocks occurs in the Kingston district. These will be studied in the field and specimens will be collected by each student for examination in the laboratory.

Boxes for holding slides and material used in the preparation of thin sections may be obtained from the janitor.

Each student must provide himself with a copy of Kemp's Handbook of Rocks (price $1.50), and a copy of Luquer's Minerals in Rock Sections.

Text-books and Books for Reference:

Rosenbusch—Iddings Microscopical Physiography of Rock-Forming Minerals.
Loewinson-Lessing's Tables for the Determination of the Rock- Forming Minerals.
Hatch's Petrology.
Harker's Petrology for Students.

ECONOMIC GEOLOGY I. D.

Before taking this class students must have passed in Geology I.

Lectures on the origin, modes of occurrence and uses of metalliferous minerals, with mention of the chief localties. The characters by which ore bodies are sometimes indicated to the prospector will be described. A sketch will be given of the geology of some of the leading mining districts.

Each student is to provide himself with a copy of Branner & Newsom's Syllabus of Economic Geology (price $2.75).

Text-books and Books for Reference:

Philips' Ore Deposits.

Kemp's Ore Deposits.

Mineral Statistics, Geological Surveys of Canada and the United States.

Rothwell, The Mineral Industry. Vols. I-XI.

Fourth Year.

GEOLOGY III. E.

A study will be made of structural and dynamical geology in connection with their bearings on economic problems.

Opportunities will be offered for those wishing to prosecute any special line of investigation.

Students are advised to devote as much time as possible to field work during the preceding long vacation, and to collect material for study in the laboratory during the winter.

Text-Books:—Geikie's Text-book of Geology.
Dana's Manual of Geology.
Geikie's Field Geology.
Geikie's Founders of Geology.
Nicholson's Palaeontology.
Williams' Geological Biology.
Kemp's Ore Deposits.

PETROGRAPHY II. F.

A course of lectures will be given on the microscopic characters and classification of the igneous rocks and on the characters, origin and classification of the pre-Cambrian formation.

Special attention will be paid to the metamorphic series of the Kingston nistrict, as exceptional opportunities are here offered for the study of the field relations of these rocks, and for attacking those problems as to their origin which are now attracting the attention of geologists.

The *petrographical laboratory* is supplied with electrical power and provided with diamond saws and other apparatus needed in the preparation of thin sections of minerals and rocks for examination by microscope.

Laboratory facilities are also provided for micro-chemical tests, and for the use of heavy solutions in separating the constituents of the rocks.

The School owns several petrographical microscopes of the latest and most improved designs.

Text-Books and Books for Reference:

Rosenbusch—*Die Massige Gesteine., Elemente der Gesteinslehre.*
Zirkel—*Lehrbuch der Petrographie.* Vols. I, II and III.
Levy and Lacroix—*Les Mineraux des Roches.*
Rosenbusch-Iddings—Microscopical Physiography of Rock-Forming Minerals.
Iddings—The origin of Igneous Rocks.
Van Hise—Correlation Papers, Archaean and Algonkian.
Iddings, Weed, Pirson, Washington—Classification of Igneous Rocks.

ECONOMIC GEOLOGY G.

Lectures on the origin, modes of occurrence and uses of the metals and their ores; materials used in the production of light and heat; minerals used in chemical manufactures; fertilizers; mineral pigments, salt, brine and mineral waters; building materials; cements; refractory materials; abrasive materials; gems and precious stones; miscellaneous.

BOTANY.

Professor—REV. JAMES FOWLER, M.A.

Pass Class.

Class meets at 10 a.m. Lectures embrace the following subjects:

General morphology of the plant body, segmentation, symmetry, arrangement of lateral members on the common axis, branch systems.

Special morphology of the members, (1) Roots, different form, duration, parasites; (2) Stems, their forms, climbing stems, &c.; (3) Leaf, phyllotaxis, venation, vernation, forms; (4) Trichomes, &c.; (5) Flowers; (6) Fruits; (7) Arrangements for cross-fertilization, close fertilization.

Anatomy of plants (Histology), cell, cell-wall, protoplasm, Chlorophyll, starch, etc.; formation of new cells, tissues, system of tissues.

Study of specimens belonging to leading orders.

Text-Books:—Spotton's Structural Botany and Wild Plants of Canada, Coulter's Plant Relations.

ANIMAL BIOLOGY.

Professor: A. P. Knight, M. A., M. D.
Tutor: A. R. B. Williamson, B. A. M. D.

Pass Class.

Lectures or demonstration will be given tri-weekly at 9 a.m.

The lectures treat of protoplasm, cells, cell division, reproduction, early stages of development, tissues, organs, differences between animals and plants, general view of invertebrata and of vertebrata, organic evolution.

The Laboratory work consists of such dissections and demonstrations, as will elucidate the subject of the lectures. The lectures are illustrated by diagrams, charts, and lantern transparencies. Text-book, Wright's High School Zoology.

MINING ENGINEERING.

Professor: J. C. Gwillim, B. Sc.

These courses are given by lectures and text-book work supplemented by models, drawings, photographs, the actual examination of mines and works, and practical work in ore dressing.

The lectures on the art of mining are designed to make the student familiar with the operations in vogue in this and other countries for finding, developing, extracting and mechanically treating minerals of economic value. It brings to a practical issue the information acquired by the lectures on mathematics, mechanics, surveying and physics. A knowledge of chemistry and mineralogy is also necessary to give a satisfactory appreciation of the character of the ores searched for or extracted. Connected with the mining of the ore, its geological association is considered.

The topics discussed are the following:

MINING I.

Ore Deposits. A brief review of the manner of occurrence of economic minerals, and their relations to the enclosing country rocks, so far as such relations can be generally stated. Also the influence of ore deposits under certain conditions upon topography, and the connection between topographic forms dependent upon geological structure and the probability of the existence of veins of ore. This discussion is merely supplementary to the more extended treatment of the subject in the Department of Geology, being designed to further emphasize circumstances of practical moment to the prospector and miner.

Prospecting. Systematic methods of rapid geological and mineralogical reconnoissance for the purpose of discovering minera deposits. Gossan and "float" phenomena fully discussed. Miner

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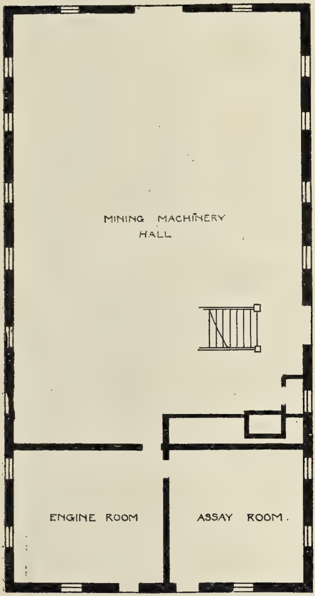

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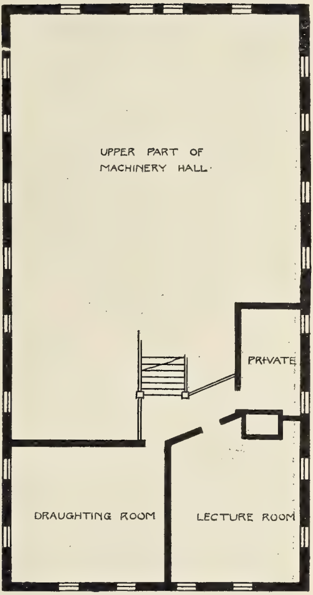

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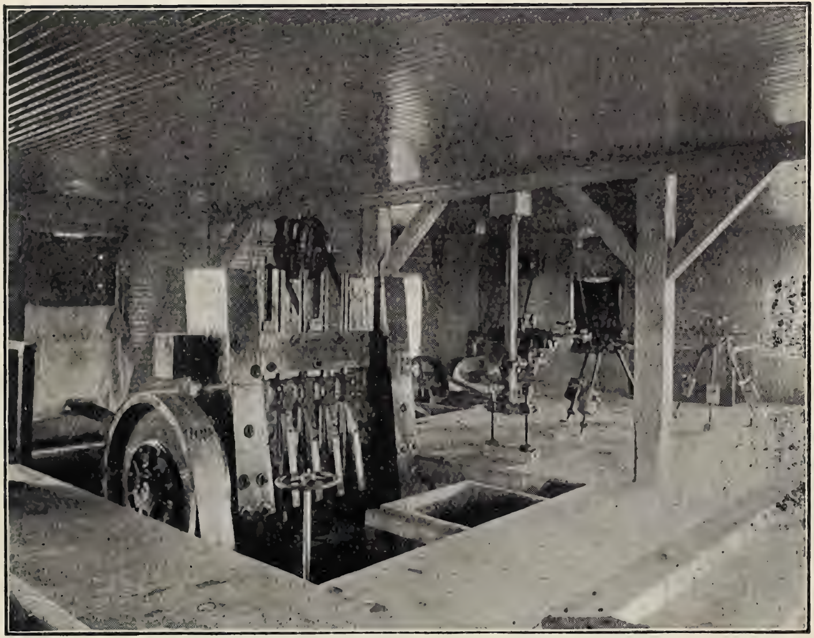


MINING LABORATORY—STAMP MILL, CRUSHERS, AND ROCK DRILLS.

als found in gravel beds in water courses, and their importance as indices of nearby deposits of valuable ores. Systematic methods for locating an indicated vein. Application of pits and the method of approximation by trenching for discovery of deposits.

Mine Development. Preliminary consideration of conditions affecting the probable success or failure of mining operations in any particular locality ; fuel, water, food supplies, transportation facilties and costs. Location and development workings. Choice of method of approach. Blocking out the ore for measurement. Systematic methods of obtaining accurate samples of ore, "in place" and on the dump. Methods of estimating the value of the mine.

Boring. Use of Bore holes. Methods of boring. Boring by percussion. Methods by rods and by ropes. Boring tools, caseing; recovery of lost tools, etc. Rotary boring. Earth augers. Diamond drills worked by hand and by machinery.

Excavation. Tools for breaking ground. Hand tools ; machine tools ; steam excavators and dredges. Hand drilling. Power drills—types, management and maintenances. Theory and practice of blasting. Kinds and effects of explosives. Location of holes. Charging and firing holes, singly, simultaneously and in series. Precautions in blasting. Substitutes for explosives.

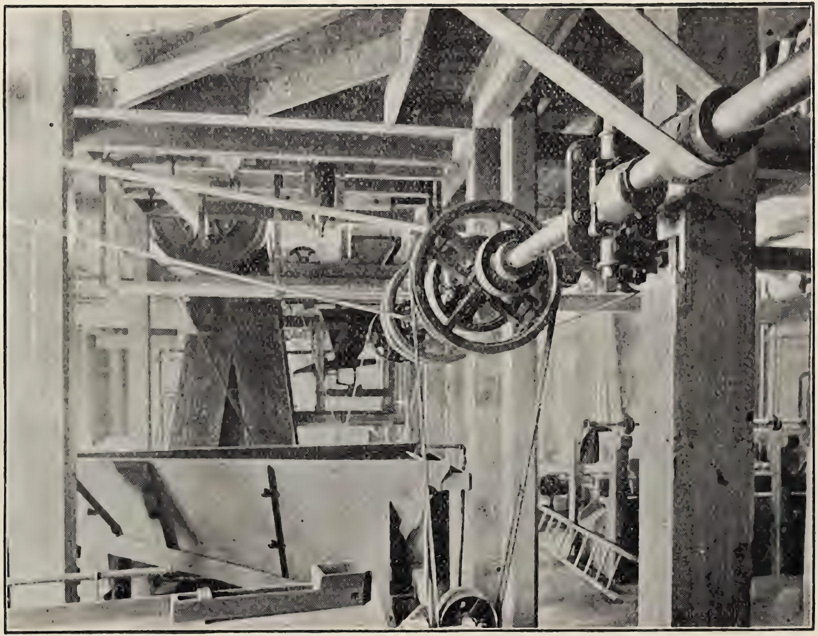
Mining Methods. Works for approach and underground communication. Shaft sinking. General principles. Protection of shaft mouth. Methods of sinking, ventilating, hoisting and unwatering during sinking. Winzes—location and methods of sinking and upraising. Tunnels, drifts, gangways, adits, slopes, contour levels. Advancing by single breast, and by benches. Trimming up and maintaining aligment.

Works for winning minerals. Stoping. Overhand and underhand stoping methods ; their application and limitations. Cross-cut methods for wide veins. Contouring, and application of cross-cut methods to masses. Stripping. Methods suitable for soft ore bodies. Pillar and breast methods and their variations. Longwall advancing and retreating methods. Methods applicable to steeply inclined coal seams. Chutes; "ore mills;" loading bins, staging for overhand work ; storage of "deads" or waste; gob walls; robbing of pillars, etc.

MINING II.

Hydraulic Mining. Methods of breaking down banks. Bringing water under high pressure, and delivery by monitors. Flumes, sluices, cleaning up, etc. Placer mining and dredging.

Supports. Timber ; kinds of timber used for supporting excavations ; dry rot ; processes used for the preservation of timber ; modes of timbering levels, shafts, winzes, slopes and other excavations ; masonry and iron or steel supports for similar purposes special methods of support in the cases of watery and running strata;



MINING LABORATORY—SPITZKNSTEN, &c.

compressed air, freezing and other processes; saving of timber resulting from the adoption of caving and filling methods.

Transportation. Underground. Wheelbarrows, their limit of efficiency. Cars—types, capacity, and maintenance. Tracks--gage; weight of rail; ballasted and unballasted and paved; turnouts; turn-tables and plates; cross-ties; sectional portable track. Haulage; man and animal power; rope traction by single, main and tail and endless rope; gravity roads; chain traction; underground locomotives; electric traction. Surface transportation; Decauville railroad; electric and endless cable traction; aerial wire rope tramways—single and double rope systems.

Hoisting. Head frames, temporary and permanent. Winding drums and engines—types and efficiency- Koepe endless rope system of hoisting. Cables—kinds, efficiency, maintenance and inspection. Buckets; kibbles; cages, skips. Safety appliances—to prevent fall of cage or skip; to prevent overwinding. Signalling.

Loading and Unloading Works. Dumping frames or chairs; tipples; elevating and conveying machinery for handling ores and coal; terminal facilities.

Drainage. Preventing access of surface water; adits or draining tunnels; siphons; removal of water by winding machinery; pumping plant; Cornish system; steam, compressed air and electrical pumping; dams.

Ventilation. Composition of air; gases met with underground; causes of the deterioration of air; dangers of dust; natural ventilation, its limitations; ventilation by furnaces; mechanical ventilators of various kinds; distribution of air through the workings; method of testing the purity of the air; fire-damp detection; methods of measuring and recording the volume of air passing through the workings.

Lighting Candles; lamps fed by tallow, and by animal, vegetable or mineral oils; safety lamps; gas and electric lamps; expense of lighting.

Descent and Ascent. Steps and slides; ladders; winding machinery; safety appliances; man-engine.

Principles of Employment. Day wages; contract work by weight or measure; contracts in which men have an interest in the value of the minerals extracted; administration, organization and business management; mine accounts.

Legislation. Special acts relating to mining properties and their operation.

Accidents. In hoisting, traction, roof falls, blasting, sudden ingress of waters, explosion, mine fires; rescuing of miners under various conditions; fire extinguishment, etc.

Mine Examination nnd Valuation.

MINING LABORATORY—BUDDLE.

DESIGNING AND MINING PROJEET.

Designing and Mining Projeet. Mine and mill designs and mapping, methods of underground surveys.

MINING III.

Advanced course for those students who wish to specialize in mining. It will include the study of mine management, accounts, the commercial side of mining and a knowledge of current affairs in mining.

ORE DRESSING.

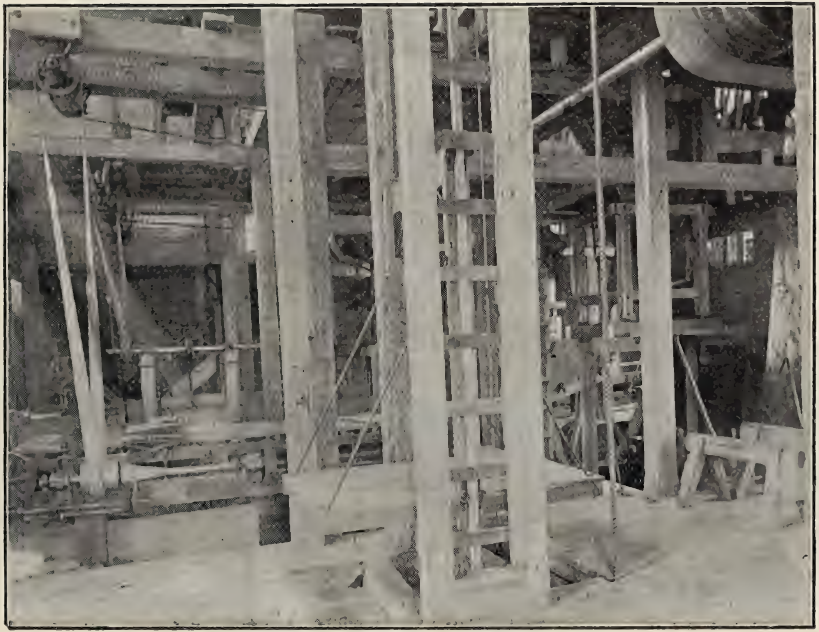
Mining I.

Ore Dressing. Picking and cobbing; crushing methods, and comparative effects in liberation of valuable minerals from gangue; sizing by screens and trommels; theory of fall of bodies in water; classification by the spitzkasten and spitzlutte; jigging, theory of; types of jigs; the jig indicator; sizing *versus* classification in the preparation of ores for jigging; friction-surface concentrators; riffle-washers; magnetic separators—types and application; special modifications of concentrators, etc,, for coal washing; schemes of practical working plants for all classes of ores.

Text-Books—(1) C. LeNeve Fosters' Ore and Stone Mining, (2) Coal and Metal Miners' Pocket-book, (3) H. W. Hughes' Coal Mining, (4) Current Mining Journals.

THE MINING LABRATORY AND ORE TESTING WORKS.

The School of Mining has developed from modest beginnings a large and comprehensive laboratory, with first-class modern equipment for the practical milling and dressing of all kinds of ores. With but few exceptions the appliances are of standard sizes, such as are employed in actual practice in large works, so that students may obtain efficient instruction in the adjustment, operation and care of this kind of machinery. An elaborate training is also given in the methods of testing ores for process, in which respect the School of Mining offers peculiar advantages, since many mine owners throughout the Dominion avail themselves of the facilities of this laboratory for working out problems in ore milling and dressing on such a scale as to furnish reliable *data* for the specification of projected plants. Thus large quantities of widely different classes of ores are being tested throughout each session, affording students valuable experience of the most practical sort.

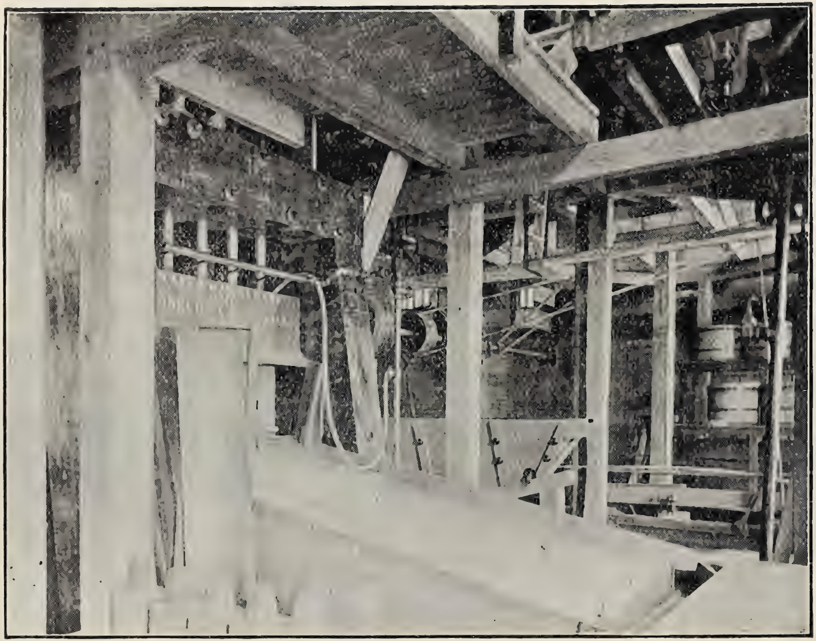


MINING LABORATORY—FRUE VANNER AND JIGS.

A systematic course of study is carried out, involving comparative investigations into the effects produced on different ores by varying methods of crushing; hydraulic classification, jigging, buddling, vanning, riffle-washing, etc., etc.

During the year 1900 the milling laboratory underwent complete reconstruction, and was more than doubled in size. Old machinery was thrown out to make room for newer and more modern designs, and large additions to the plant were made, so that this laboratory now ranks as one of the largest and most perfect of its kind on the American continent. The equipment as it stands at present consists of the following :—10 in. by 7 in. Blake jaw crusher ; 16 in. high speed rolls ; 5 stamp battery 850 lbs, stamps with automatic feeder ; 10 in. cone grinder ; No. 0 Krupp Ball Mill ; inlet discharge classifier ; vertical line classifier ; U-tube classifier for slimes ; perforated board classifier for slimes ; 3 compartment spitzkasten ; 3 compartment Hartz jig ; 2 compartment Evans high-speed jig ; 4 ft. Frue Vanner ; Wilfley table (riffle washer) ; 16 ft. modern Evans buddle ; Wetherill magnetic concentrator ; barrel chlorination plant (350 pounds capacity) ; cyanide plant two leach vats, with solution and slump vats (1000 pounds capacity) ; reverberatory roasting furnace ; Sturtevant exhauster and blower ; German dust tower ; Heald and Sisco centrifugal pump ; Frenier and Sons spiral sand pump ; Cazin water-motor ; Northey mine pump ; gyratory screen ; centrifugal machine for slime treatment ; Johnston filter press for slime treatment ; Ingersoll-Sergeant rock drill ; Mac Machine Company's balanced valve rock drill ; Rand rock drill ; tripods for rocks drills ; drifting column for rock drill ; Jackson's hand-power rock drill ; 25 H. P. Robb engine.

A convenient assay laboratory has been fitted up in connection with the mill, where all the wet and fire assaying required for checking the mill work can be carried on.



MINING LABORATORY—FRONT OF STAMP MILL.

MINING LAW.

Lecturer: J. BAWDEN, BARRISTER-AT-LAW.

SUBJECTS.

Law of Property iu Mines:

Contracts for purchase and lease of Mines; Options; Mines Act, R.S.O., chapter 36 and amendments.

Mining Companies Incorporation Acts:

Liability for misrepresentation in prospectus.

Mine Accidents:

Statutory Rules; Inspector's Enquiry; Employer's Liability.

METALLURGY.

Professor: S. F. KIRKPATRICK, M. SC.

A thorough drilling in fuels, the special metallurgical uses of each kind, determination of calorific power experimentally and by calculation from composition, calorific intensity and mehods of pyromettry, charcoal manufacture, coals, coke, coking methods, physical and chemical tests of coke, by-product coking, producer gas and its manufacture in modern approved appliances, liquid fuels, etc.. This is followed by a discussion of the physical properties of the common metals, the effect of different impurities, and the constitution and character of the more important alloys.

Gold Milling. Free milling plants; types of stamp mills, their efficacy and limitations. Construction and maintenance of stamp mills. Other methods of crushing for amalgamation. Principles and practice of amalgamation.

Furnaces. Furnaces, their kinds and development; special uses; principles of construction. The modern iron blast furnace; low shaft furnaces for lead and copper—types and relative efficiency, reverberatories for solid and gaseous fuel; regenerative furnaces; retort furnaces, etc.

Slags. Types of slags; functions of slags; properties of fluxes; calculation of slags.

Supplying Air to Furnaces. Blowers and blowing engines; hot blast stoves; resistance of column of fusion; regulation of blast.

Roasting and calcination. The preparation of ores for smelting by roasting in heaps, kilns, reverberatories, revolving, and variou mechanical roasters, is fully explained.

METALLURGY II.

Hydrometallurgy of gold and silver including Cyaniding and Chlorination of gold ores and leaching of silver ores with hyposulphite.

Milling and amalgimation of silver ores.

Metallurgy of copper, including treatment of native copper and sulphide ores by concentration and smelting, reverberatory and blast furnace matting, pyritic smelting, refining and hydrometallurgy.

Metallurgy of lead, including reverberatory and blast furnace practice, softening, deselvirezing, refining, etc.

Metallurgy of iron and steel, including preparation of the ore for smelting, production of pig-iron in the blast furnace, convertion into wrought iron in the puddling furnace, manufacture of steel by the crucible, Bessemer and open hearth processes.

Metallurgy of zinc, manufacture in retorts and muffles.

Metallurgy of nickel.

METALLURGY III.

Electro-metallurgy; introductory course in electro-chemistry followed by the consideration of the electric smelting of aluminum, copper, magnesium, iron, etc.

Also the consideration of the ordinary methods of recovering tin, mercury, arsenic, antimony, etc., from the ores.

METALLURGICAL READING.

The student will be required to study more particularly the metallurgy of some special metal or metals, obtaining the required text-books on the subject and reading in the library so as to be able to pass an examination on the subject in the spring.

Text-books and Books of Reference:

Metals, by Huntington & Macmillan (3rd year).
Introduction to the Study of Metallurgy. W. C. Roberts Austin.
Hand-book of Metallurgy, by C. Schnabel.
Gold, the Metallurgy of. T. K. Rose.
Stamp milling of Gold Ores. Rickard.
Practical notes on the Cyanidi Process. F. L. Bosqui.
Modern Copper Smelting. E. D. Peters.
Metallurgy of Lead. H. O. Hufdman.
Manufacture and Properties of Structural Steel. H. H. Campbell.
Steel. A manual for steel users. William Metcalf (4th year.)
Electric Smelting and Refining. Borehers & Macmillan.

THERMODYNAMICS.

Professor: L. W. Gill, B.Sc.

I

Fundamental laws of Thermodynamics. Behavior of gases under varying conditions. Theory of air compressors and air motors.

Transmission of power by compressed air. Properties of steam and elementary theory of the steam engine. Thermal and mechanical efficiency of heat engines. Operation of simple valves and governors. Measurement of power. Elementary theory of gas engines.

Simple laboratory experiments in the second term.

II.

Theory of refrigerating machines and systems. Entropy and entropy-temperature diagrams. Superheated steam. Performance of actual engines. Influence of size, speed and ratio of expansion on economy. Steam jackets. Compound and triple expansion engines. Expansion valves. Advanced theory of gas and oil engines. Steam turbines.

Experiments in Thermodynamic Laboratory.

THERMODYNAMIC LABORATORY.

The equipment of this laboratory will include a gas engine, an air compressor, a fan, steam engines and all the auxiliary apparatus required for making tests and carrying on experimental work. All apparatus will be of a standard type and latest design.

Part of the practical work in Thermodynamics will be carried on in connection with the new central heating and power plant which supplies heat and power to the various college buildings. This plant affords exceptional advantages for carrying on experimental work, having been designed with due regard to this feature.

GENERAL ENGINEERING.

Lecturer: CAPT. J. L. H. BOGART, B.SC., C.E,

ENGINEERING I.

Materials of Construction—Mechanics of Materials.

The lectures comprise : Physical properties of the metals and alloys used in Engineering and the effects of impurities in them ; testing for tensile, compressive and transverse strength ; resistance and elasticity of materials ; investigation and design of beams ; cantilevers and simple beam ; restrained and continuous beams columns ; shafts ; flexure of beams ; strength and quality of timber, stone, brick, cements and mortars.

Problems will occasionally be assigned to the class, the solutions of which will be handed in for correction.

Lecture Hours—Mondays, 11 a.m. Thursdays, 9 a.m.
Text-book: Merriman's "Mechanicals of Materials."
Books of Reference:—Thurston's "Materials of Construction"; Langa's "Applied Mechanics"; Merriman's "Strength of Materials."

ENGINEERING II.

Structural Engineering.

Before attending this class students must have passed in Mathematics I. and II. and Engineering I. Lectures comprise:

Analytical determination of stresses in the members of framed structures under various conditions.

Roofs.—Types of roofs for different spans; stresses on members; design of roof trusses; roofing material, joints, &c., in wood and iron.

Highway Bridges.—Kinds of trusses used; stresses under all conditions of loading; design of trusses, joints, &c.

Railroad Bridges.—Complete analysis of the general types used and designs of same for given spans, loads, &c.; shop work.

Cranes, drawbridges, the trussed bent, trussed tower, cantilever arm, plate girders, lattice girders and tubular bridges.

Foundations.—Construction and design of piers and abutments.

Masonry Dams.—Construction and design for reservoirs, &c.

Retaining Walls—Principals and designs.

Problems will occasionally be assigned to the class, the solutions of which must be handed in for correction.

Lectures—Mondays and Fridays, 2 p.m.
Text-books:—Merriman's "Roofs and Bridges," Parts I. and III.

GRAPHICAL STATICS.

This class is taken in connection with Engineering II., and solutions of problems, done analytically, are the basis of the graphic work.

Problems will be assigned to the class and complete graphic solutions worked out in the form of plates.

Lectures.

Graphic representation of Force, Equilibrium Polygon, showing Forces, Bending Moments, Centres of Gravity, Moments of Inertia, Determination of Stresses in Roof and Bridge Trusses, Plate Girders, Cranes, Cantilever Arms, &c.

Students will be required to do problems outside of lecture hours.

ENGINEERING III.

Hydraulics,

Application of hydrostatic pressure in the case of dams, gates and pipes. Flow of water and measurement of its volume by various orifices and weirs. Flow in open channels, streams, ditches, flumes, &c., and the use and application of these conductors of water. Flow through tubes and pipes. Use of pipes as conductors of supply for domestic and power purposes. Dynamic and static pressure as applied to motors for power purposes, The efficiency of various water wheels, turbines, &c. Naval hydromechanics, including the propulsion of bodies through water.

CIVIL ENGINEERING.

Professor ;

I.

Common roads.—Canals, river and harbour improvements. Methods and cost of construction and maintenance, and their effect on traffic and cost of transportation.

II.

Foundations.—Design and calculation of the supporting power of foundations for different kinds of structures. Masonry dams and retaining walls.

Structural Designing.—The forms of the various bridge members, and the determination of their sectional area. Design of the various connections. The student will be required to make a complete design of a bridge and abutments for a given span and location, including specifications, estimates, and allthe necessary drawings for construction purposes.

Building Construction.—Building material and building construction, including the framing of roof trusses. Slow-burning construction.

MUNICIPAL ENGINEERING.

Lecturer: Mr. A. KIRKPATRICK.

Municipal Water Supply. Source of Supply. Rain Fall, etc. Quantity, quality and purification of water. Distribution, designing and details of construction. Domestic systems.

Sewerage. The various systems of collection, removal and disposal of sewerage. Proportioning of the size, grade and flow in sewers, and the methods of ventilation, flushing and inspection. Methods of construction and material used.

Streets. Grades, road-beds and layout. Permanent walks. Methods of construction, materials used, average life and cost.

RAILROAD ENGINEERING.

Leciurer: Mr. A. KIRKPATRICK.

I.

Methods of construction. Setting out work. Calculation of quantities. Oveihaul, etc. Effects of grades and curvature on traffic. Explosions and their uses.

II.

The design and construction of railroad structures and their foundations, including box and arch clelverts, bridge piers and abutments, and the various methods of obtaining and preparing foundations. Masonry and concrete work. Pile and frame trestles, Methods and matertals of construction. The engineering branch of the maintenance of a railroad. Duties of the engineers and the law applying to railroads.

ELECTRICAL ENGINEERING.

Professor: L. W. GILL, B.Sc.

I.

Electro-magnetism and electro-magnetic induction. The magnetic circuit. Induction of electric currents. Power and heat from electric currents. Self and mutual induction. Elementary theory of alternating and direct current generators and motors. Arc and incandescent lighting. Common methods of transmission and distribution of currents.

II.

Measurement of magnetic quantities. Further points in the theory of themagnetic circuit. Hysteresisandhysteresis loss. More advanced theory of self and mutual induction. Laws governing the flow of alternating currents in circuits containing resistance, inductance and capacity.

Elementary laboratory work.

III.

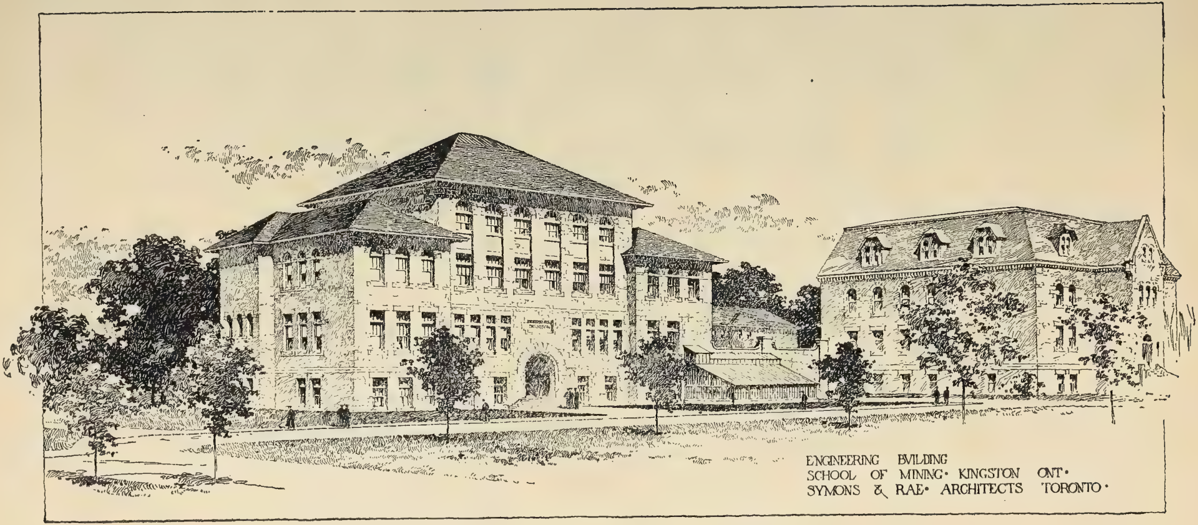
Advanced theory of direct current machines. Commutation and armature reaction. Series, shunt and compound machines. Efficiency, operation and control of direct current generators and motors.

Laboratory experiments with standard types of direct current generators and motors.

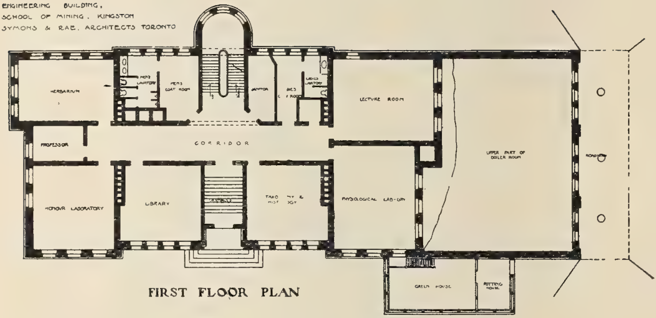
IV.

Theory of alternating current generators. Synchronous and induction motors. Transformers. Phase changing. Multiphase systems. Transmission of power by alternating currents.

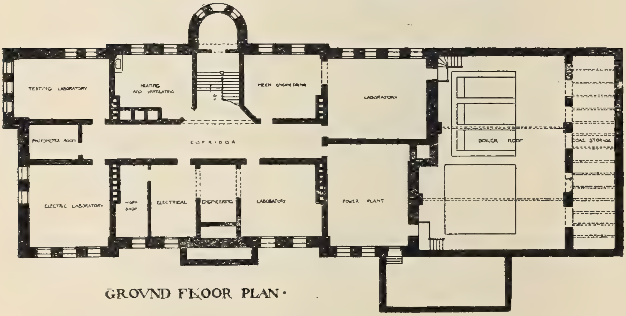
Laboratory experiments with standard alternating current apparatus.



ENGINEERING BUILDING
SCHOOL OF MINING· KINGSTON ONT·
SYMONS & RAE· ARCHITECTS TORONTO·



FIRST FLOOR PLAN



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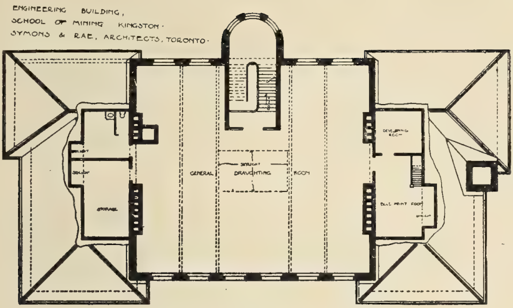
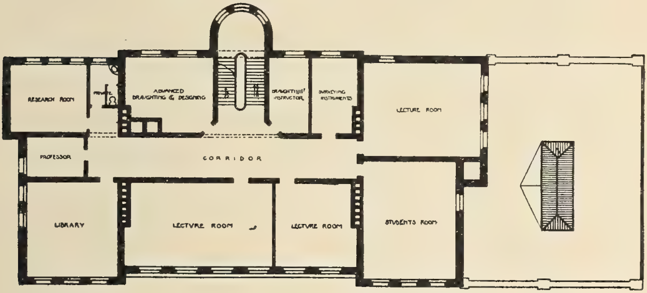


THIRD FLOOR PLAN



SECOND FLOOR PLAN

V.

Design of direct and alternating current apparatus.

The student will be required to design and make complete drawings of one or more pieces of apparatus.

MECHANICAL ENGINEERING.

Professor: L. W. Gill, B.Sc.

I.—*Machine Design.*

Simple and compound stresses. Allowable stress under various conditions. Straining actions in machines. Elementary principles of design. Application of principles to the design of bolts, cotters, riveted joints, pipes and cylinders, bearings and journals, shafts and couplings. Belts, ropes and pulleys.

II.—*Dynamics of Machines.*

Dynamics of rotation. Efficiency of the screw, taking friction into account. Elementary dynamics of the steam engine. Fluctuation of crank effort. Speed and energy of fly-wheel. Balancing of engines. Governors. Centrifugal machines.

III.—*Mechanical Drawing.*

Advanced exercises in drawing. Designs of simple machines.

FOURTH YEAR.

IV.—*Mechanical Engineering.*

Steam production. Boilers and boiler installations. Fuel and combustion. Steam distribution and performance of steam driven machinery. Steam pumps. Transmission and distribution of power by steam, shafting, belts, compressed air and electricity.

Gas production. Performance of gas and oil engines.

Friction and lubrication. Dynamometers and brakes. Elements of locomotive engineering.

V.—*Mechanical Drawing and Design.*

The complete design of some complex machine and the preparation of requisite drawings, tracings and blue prints.

ELECTRICAL LABORATORIES.

These laboratories will be equipped with standard types of alternating and direct current apparatus. The various laboratories are the Electrical Testing Laboratory, containing generators, motors and transformers; the Photometer Room, in which all measurements of candle power are made; the Standardizing Laboratory and the Research Laboratory.

The following apparatus will be available for experimental work next session:—

A $12\frac{1}{2}$ k. w. direct current generator.
A 2 h. p. direct current motor, made in the workshop of the School.
A 10 k. w. rotary converter, 2 phase or 3 phase.
A 10 h. p. induction motor
Two transformers, apparatus for measuring permeability and hysteresis, voltmeters, ammeters and wattmeters.

MECHANISM.

Lecturer: N. F. DUPUIS, M. A., F. R. S. C.

Students who take this class are expected to have passed in the subjects of Mathematics I and II.

The instruction is given in lectures, with references to books, and will be illustrated by numerous working models of elementary mechanical elements and their combinations. Exercises in invention by the putting together of mechanical elements will be required.

Students will accompany the lecturer on certain visits to the principal manufacturing establishments of the city in which interesting machinery is employed, and explanations of the various pieces of mechanism will be given *in situ*.

DRAWING.

Lecturer: CAPT. J. L. H. BOGART, B.Sc., C. E.

The lectures and practical work are arranged with a view to preparing students for the subjects of Mapping, Mechanical Drawing, Descriptive Geometry, &c, in the different branches of Engineering.

Each student at the opening of the term must provide himself with sets of drawing instruments, scales, set squares, T. square, thumb tacks, pencils, pens, inks and drawing paper of approved standard.

Attendance of at least 5 hours a week is required and students must arrange for these at commencement of term.

The weekly lecture will be on Thursdays from 10 to 12 a.m.

Students are not admitted to examinations in drawing until they have completed the practical work of the year.

The lectures will comprise—Practical Geometry of the line, circle, ellipse, parabola, hyperbola, spirals, cycloids, &c with problems in the from of plates assigned to class, projections of planes and solids, Elementary Descriptive Geometry, Elementary Perpective, Isometrie Projecture, Elementary Machine Design and Lettering.

Workshop drawings will also be assigned as exercises.

Text Books : Rawles Practical Geometry, Daniel's Lettering.

MAPPING.

CAPT. J. L. H. BOGART, B.Sc., C.E.

This subject is carried on in connection with Surveying and Engineering branches.

Students must complete Surveying I. and Mapping I. before they are eligible for Mapping II.

MAPPING I.

The practical work covers Lettering, Titles, Scales, Copy of Plans, Tracing, Blue Printing, Coloring. &c. Also the field notes of surveys made during the term under Surveying I. are plotted during these attendances.

Survey notes and calculations will be examined under this subject.

MAPPING II.

Plotting of Surveying II., field work, comprising generally a plan profiles cross-sections, &c., of a railway survey with calculations of quantities and complete notes. Plans and drawings connected with the different branches of Engineering.

NOTE.—Qualification in Mapping I. and II. will be based on the work performed during the term.

SURVEYING.

Lecturer : CAPT. J. L. H. BOGART, B.Sc., C. E.

All branches of surveying receive full consideration. Students during the outdoor instruction are given every opportunity to become familiar with the instruments. The notes of all field work are plotted during the term. The text-book to be used will be Reynold's "Plane Surveying." No student will be eligible for Surveying II unless he has completed the fieldwork and plotting of Surveying I and Mapping I.

Candidates are not admitted to examinations in Surveying until they have completed the mapping of the same year.

SURVEYING I

Lectures First Term.

These comprise the classification of the different branches of surveying, conventional signs used, description, use and adjustments of chains, tapes compasses, transits, levels and other surveying instruments. Methods of surveys of different classes including field work, taking of notes, &c.

A chain survey will be made by the class during special hours selected during the fall term, the notes of which will be plotted during Mapping I second term.

Lectures Second Term.

The methods of plotting transit surveys, distributing errors, land survey computations and the laying out of land into required areas.

Farm surveys, Topographical surveying, Stadia surveys, Earthwork computations, Grading, and the laying out ot curves—Simple Compound and Reverse curves.

The class is prepared by these lectures for the Fall work in Surveying II

Lecture hours Mondays and Wednesdays, 9 a.m.

Text Book: Reynold's Plane Surveying.

Books of Reference: Gillespies Surveying and Engineers Pocket Books.

SURVEYING II.

Students about to take Surveying II must be present at the School of Mines on September th, 1903, to begin field work and are required to buy a Surveying Note Book which can be procured at the School of Mining. The field course which extends from above date to opening of college is carried out under camp organization, the tents, camp utensils, and army sheets being provided. The expense of provisions, cooks, transport of personal baggage &c is borne by the class an advance being made to cover the same. Each student should provide himself with pair of heavy blankets. The notes of this field work are plotted during term Mapping II.

Lectures First Term.

Civil Surveying.—Comprising Simple Triangulation, Palne table and its use on Topographical work, Hydrographical Surveying, City Surveying, Surveying for Engineering works e. g., Building sites, Bridges, Reservoirs, dams, &c. Simple Angular and Barometric Levelling.

Dominion Land Surveying.—Comprising the methods adopted in the Survey of Dominion Lands, as laid down in the Manual of Survey issued 1902 by the Dominion Government.

Lectures Second Term.

Geodesy.—Comprising the higher branches of Surveying and the methods of procedure as carried on in England, France, India, &c., and in the coast surveys of the United States.

Railway Surveys—Including reconnaissance preliminary, and location surveys, the camp organization and routine being followed in field course of this year. As much practical work as possible in field problems of curves, switches, &c., is aimed at in this branch, and during term special hours will be appointed for outdoor work.

Lecture hours—Tuesdays, 8 p.m. Fridays, 9 a.m.

Books of Reference :—Raymond's Surveying, Gillespie's Surveying Parts I & II, Trantumes Engineer's Pocket Book, Engineer's Field Books by Shunk, Searles and Godwin. Gen. Oliver's notes on Geodesy ; D. L. S. Manual of Survey ; Gore's elements of Geodesy.

SURVEYING III.

The work on Surveying III will comprise a course of lectures on Mine surveying and also the plans and drawings of a mine survey to be executed during the term. Problems will also be assigned to the class to be solved outside class hours.

The course of lectures will be given during 1st term on Thursdays at 3 p.m.

Books of Reference :—Borugh's Mine Surveying, Raymond's Surveying.

MECHANICAL LABORATORY.

Students must enter their names in the mechanical laboratory at the beginning of the session, and, except for special reasons, each student is allowed to work only at the hours allotted to him. Students must take the workshop practice in the first two years of their attendance, unless specially exempted by the faculty.

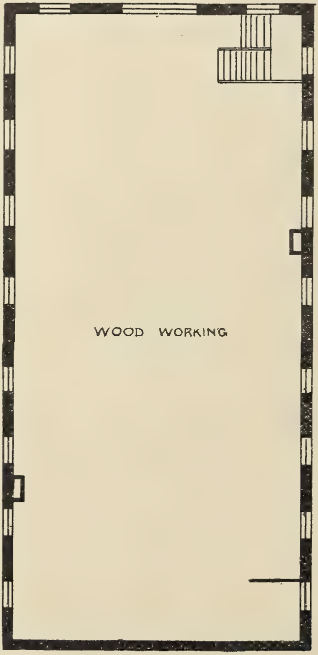
In the mechanical laboratories the student constructs parts of machines or pieces of mechanism *ab-initio*, making his own drawings and patterns, and working the crude material into complete form. In this way he is introduced to the actual use of tools, both simple and complex, such as saws, chisels, files, lathes, planers, shapers, gear cutters, drills, borers, etc.

Every student will have allotted to him the work which he is required to do, and his standing in the class will depend upon the quality of the work done, and the spirit in which it is done, rather than upon quantity.

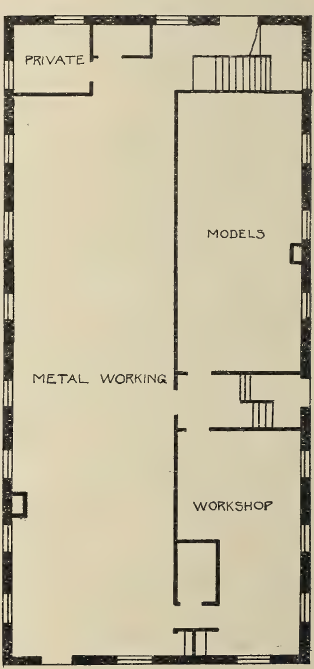
While the student must do his own work, he will receive the personal direction and guidance of a competent instructor.

The model room contains a large number of working models which are open to be studied by students.

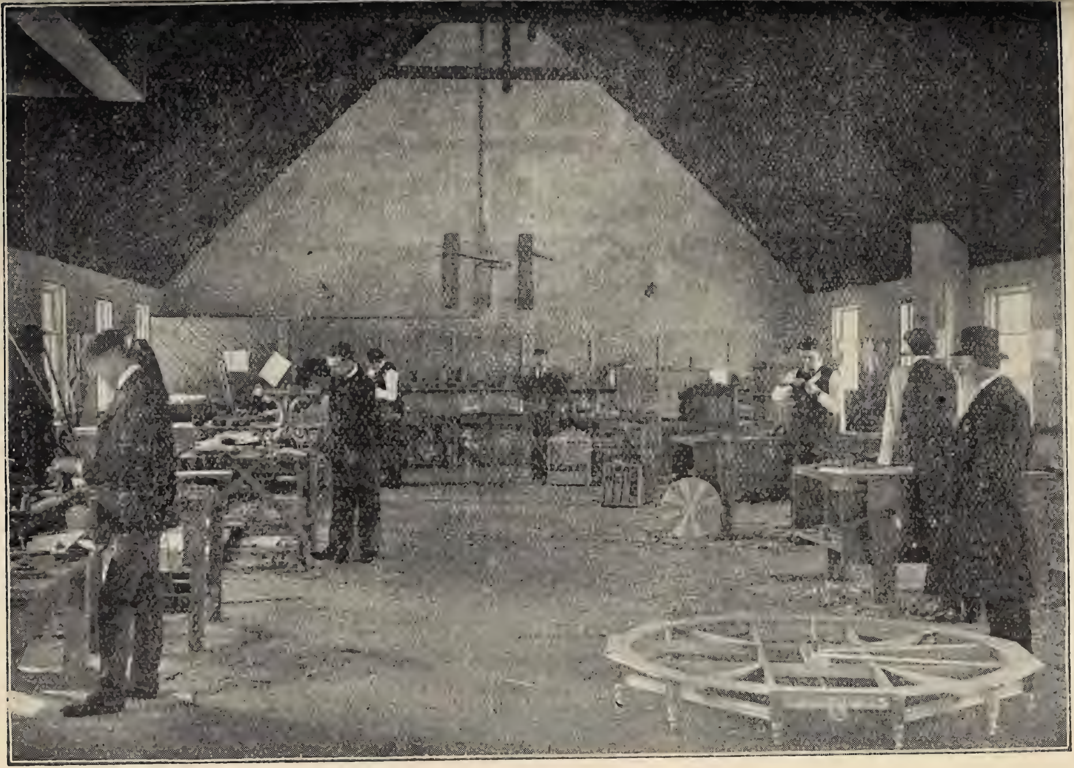
MECHANICAL WORKSHOP
SCHOOL OF MINING KINGSTON ONT.



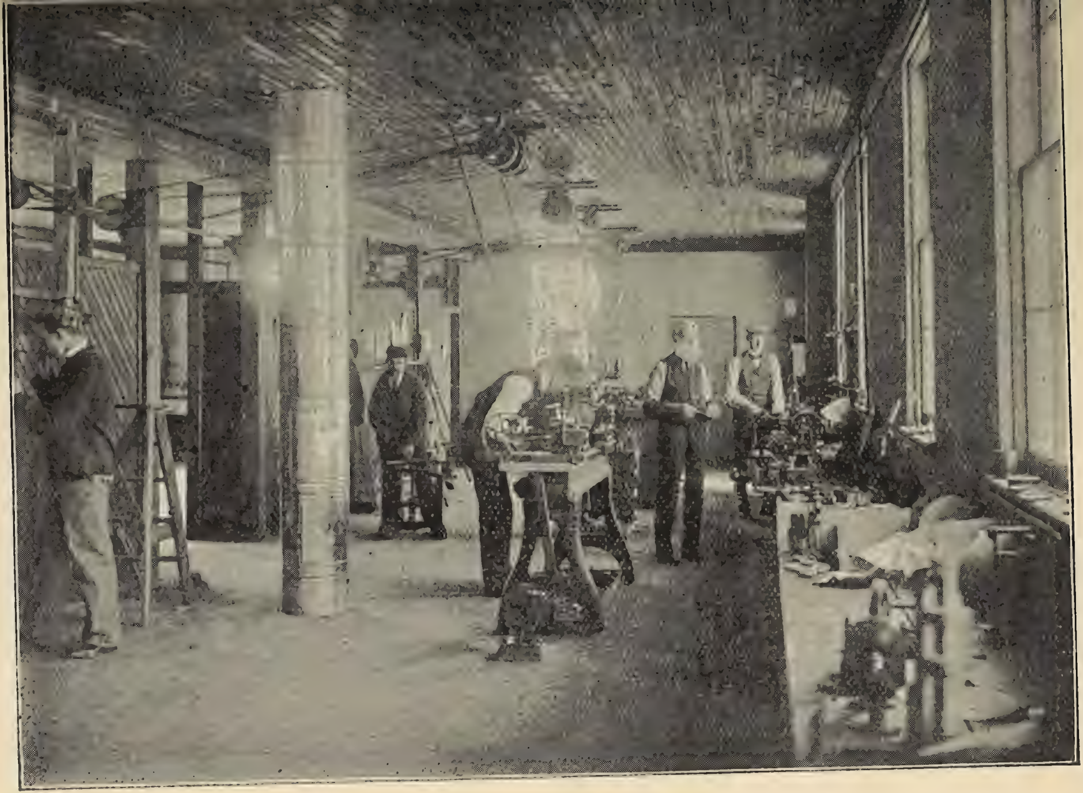
SECOND FLOOR PLAN



FIRST FLOOR PLAN



MECHANICAL LABORATORY—WOOD DEPARTMENT.



MECHANICAL LABORATORY—IRON DEPARTMENT.

FIELD CLASSES IN GEOLOGY AND PROSPECTING.

The attention of students and others is called to the practical study of geology, mineralogy and prospecting methods. Some of the chief mineral localities of the Kingston district are visited each session, and abundant opportunities are offered for collecting specimens and studying the modes of occurrence of substances of economic value. All students in geology and mineralogy are expected to take advantage of these excursions.

MINERAL AND GEOLOGICAL SPECIMENS.

It is desired to make the collections of this School as complete and representative as possible of the mineral resources of Canada. Specimens presented to the School will be named free of charge. Good specimens presented to the School will be labelled with the name of the donor and the locality, and will be preserved in the museum for reference.

Samples under 25 lbs. in weight may be sent by express; over that weight by freight.

Specimens should be addressed to the Professor of Mineralogy, or to the Professor of Geology, School of Mining, Kingston, Ont.

GIFTS OF MINERALS.

Samples of silver ores from Slocan District, B.C. S. McCallum, Esq.

Ore pulps from Slocan District, B.C. G. W. Chaplin, Esq.

Samples of asbestos from Black Lake, Que. W. J. Woolsey, Esq. Mass of native copper crystals from Michigan. T. Fee, Esq.

Arsenopyrite from Deloro, Ont. S. N. Graham, B.Sc.

Danalite and Aspodumene from Paint Hills, James' Bay. J. C. Murray, B.Sc.

Dawsonite from Montreal. Prof. N. N. Evans, McGill University.

Calcite from Niagara Falls, T. N. Scott, B.Sc.

Mica from "Smith & Lacey" mine. M. McNaughton, Esq., Gen. Electric Co., Sydenham.

Albertite from New Brunswick. C. J. Osman, Esq., M.P.P., Mgr. Albert Mf'g. Co., Hillsboro, N.B.

Howlite. R. W. Leonard, Esq., C.E., Port Hawkesbury, N.S.

Bornite from Parry Sound. Earle Armstrong, Esq., Parry Sound.

Native Gold in Quartz from the Grace Mine, Michipicoten. P. N. Nissen, Esq.

Chalcocite, Jumbo Mine, Alaska. Dr. Fred. J. Pope, New York.

Molybdem Camden Township. J. M. Chisholm, Esq. and W. D. Hart, Esq., Kingston.

Manganese and iron ores from Ferrona Blast Furnace. T. J. McFarlen, Esq., Ferrona, N.S. Feldspar, etc. H. Richardson, Esq., Kingston.

GIFTS OF REPORTS, PERIODICALS, &c.

MAY—DEC., 1902.

Canadian.

Department of Agriculture, Ottawa,
    Statistical Year Book 1901.
Department of Agriculture, Ontario,
    Report of Farmer's Institutes, 1901, Pt. I.
Geological Survey,
    Summary Report for 1901.
    Palaezoric Fossils, Vol. II, Pt. I.
        Vol. III, Pt. 1, 2, 3.
    Contributions to Canadian Palaeontology, Vol III.
    Geological Map of Canada, Western Sheet.
Bureau of Mines, Ontario,
    Report 1902.
Department of Mines, B. C.
    Annual Report for 1901.
Department of Mines, Province ot Quebec,
    Mining operations of Province of Quebec in 1901.
Canadian Mining Institute,
    Journal, Vol. V.
Canadian Institute,
    Transactions, Vol. VII, Pt. 2.
    Proceedings No. 11.
Manitoba Historical and Scientific Society,
    Annual Report 1901. Transactions 61, 62.
Marine Biological Laboratory,
    Contributions to Canadian Biology 1901.
Nova Scotia Institute of Science,
    Transactions, Vol. X, Pt. 3.
McGill University Magazine, Vol. I.

British and Colonial.

Geological Survey of the United Kingdom,
    Summary of Progress, 1900, 1901.
Board of Trade,
    8th annual abstract of Labour Statistics of the United Kingdom.
Board of Education, London,
    Various Reports on Educational matters.
New South Wales.

Geological Survey, Mineral Resources, No. 9, 10. Hand-book of Mining and Geological Museum, Sydney. Annual Report Department of Mines, 1901.

Victoria.

Report on the Pittfield Plains Gold Field, 1901.

West Australia.

Statistical Register for 1900.

Annual Report Department of Mines, 1901.

Queensland.

Geological Survey. Bulletin 18; Annual Progress Report 1901; Reports of various Coal Fields.

New Zealand.

Coal Mines of New Zealand the Report of Commission 1901.

Papers and Reports related to Mineral and Mines 1902.

Australasian Institute of Mining Engineers.

Transactions, Vol. VIII, Pt I; Proceedings March 1902.

South Africa.

Record of Mines. Tarcoola and N. W. District.

British South Africa Co.; Mining in Rhodesia 1902.

American and Foreign.

United States Geological Survey.

Annual Report Vol. XXI, Parts 2, 3, 4, 5, 7, Geology and Mineral Resources of Copper River District, Alaska.

Reconnassances in the Cape Nome and Norton Bay Regions, Alaska, 1900.

Many Bulletins to supply missing numbers, and in continuation of the series.

United States Treasury Department.

The World's Sugar Production and consumption. Commerce and Navigation of the United States 1897. Also various papers on Exports, Imports, and material resources of the United States.

United States Department of Agriculture.

Field operations of the Division of Soils. 17th annual Report of Bureau of Animal Industry. Timber Pines of the Southern United States. Progress of the Beet Sugar Industry 1901. Report of the Secretary of Agriculture on Forests, Rivers and Mountains. The Woodmen's Hand-book, Pt. I. Also many pamphlets connected with Forestry, Soil and Chemical matters related to Agriculture.

United States Department of Interior.

Twelfth census of the United States, Vol. VII, Manufactures Pt. I. Also more than fifty separate Bulletins regarding the census of Mannfactures.

United States Department of State.

Commercial Relations of the United States during 1901, Vols. I and II.

United States Department of Education.
  Report of the Commissioner of Education 1899, 1900, Vols. I and II.
Arkansas Experimental Station Bulletin No. 74.
California State Mining Bureau Bulletin No. 23, 24.
Iowa Geological Survey Reports Vols. 11 and 12.
Kansas Minerals Resources 1900, 1901.
Massachusetts State Board of Health Annual Report Vol. 33, 1902.
Michigan; Report of the State Board of the Geological Survey, 1901.
New Jersey; Annual Report of the State Geologist, 1901.
New York State Board of Health, 21st Annual Report, 1900.
Pennsylvania Bureau of Mines Report, 1901.
South Dakota School of Mines, Bulletin No. 6. Geological Survey No. 23.
Texas University; Mineral Survey Bulletin, No. 34.
Washington Geological Survey Vol. I, 1901.
West Virginia; 19th Annual Report of Coal Mines, 1901.
Cornell University Transactions of the Association of Civil Engineers.
Smithsonian Institute Annual Report, 1901.
Discurso leido en la Universidad Central Madrid.
Also the Current Volumes as issued of—
The School of Mines Quarterly.
The Yale University Science Monthly.
Technology Quarterly.
Technology Review.
Record of Technical and Secondary Education.
Journal of the Society of Western Engineers, Chicago.
Proceedings of the American Society of Civil Engineers.
The Electricial News, Toronto.
The Canadian Engineer, Toronto and Montreal.
Canadian Journal of Fabrics.
Engineering, London.
Cassier's Magazine, New York.
Engineering Times, London.
Industrial Canada, Toronto.
Cement and Engineering News, Chicago.
Kuhlow's German Trade Review, Berlin.
Industrial Advocate, Halifax.
Canada Lumberman.
Progressive Canada.
Mines and Minerals, Scranton, Pa.
Mining, Spokane, Wash.
Mining Reporter, Denver, Col.
B. C. Mining Record, Victoria, B. C.
Science and Art of Mining, Wigan, England.
Iron Trade Review, Cleveland, Ohio.

Canadian Manufacturer, Toronto.
Western Mining World, Chicago.
Canadian Mining Review, Ottawa.
The Mining Journal, London.
The Canadian Patent Office Record.
The Mail and Empire, Toronto.
Inland Revenue Bulletin.
Labour Gazette.
The Illustrated Journal of Patents, London.
Diplomatic and Foreign Reports, Foreign Office London.
    Annual Series.
    Treaty Series.
    Miscellaneous Series.
Consular Reports, Washington.
Special Consular Reports.
Bulletin, Department of Labor.
North Carolina Bulletin of Agriculture.
Experimental Station Record, Washington.

GRADUATES.

In the list are included graduates in the Faculty of Practical Science (B.Sc. and E.M.) and those graduates in Arts (B.A., M.A. and D.Sc.) since 1887, who after graduation have devoted themselves to scientific pursuits.

Graduates will confer a favour by forwarding changes of address to the Secretary.

Name.	Date of Graduation.	Occupation and Address.
Baker, J. C. B.Sc.	1903	Topographical Surveys Department, Ottawa.
Baker, H. S., B.Sc.	1902	Westinghouse Co., East Pittsburgh, Pa.
Baker, M. B., B.A., B.Sc.	1902	Explorer, Hamilton Iron and Steel Co., Hamilton, Ont.
Baker, Wm. C., M.A.	1895	Lecturer on Physics, School of Mining.
Bell, Jas. M., M.A.	1899	Post Graduate, Yale.
Brock, Reg. W., M.A.	1895	Geologist, Geological Survey, Ottawa.
Burrows, A. G., M.A., B.Sc.	1902	Provincial Assayer, Belleville.
Craig, H. B. R., B.Sc.	1903	Assistant Engineer, C.P.R. Surveys.
Craig, J. D., B.A., B.Sc.	1900	Assistant, Topographical Survey, Ottawa.
Currie, P. W., B.Sc.	1901	Assistant, Topographical Survey, Ottawa.

Name.	Date of Graduation.	Occupation and Address.
Donnelly, John, jr., E. M.	1898	Hydraulic and Mining Eng., Kingston.
Dwyer, E., B.Sc.	1902	Westinghouse Co., East Pittsburgh.
Fairlie, M. F., B.Sc.	1902	B. & M. Copper Smelter, Montana.
Finlayson, M. D., B.Sc	1903	
Fortescue, Charles L., B.Sc	1898	Westinghouse Co., Pittsburg, Pa.
Fox, Charles B., M.A.	1895	Superintendent Hamilton Iron and Steel Co., Hamilton.
Gordanier, W. N., B.Sc.	1903	
Graham, S. N., B.Sc	1900	Surveyor and Draughtsman. Dominion Coal Co., Sydney, Cape Breton.
Grover, G. A., B.Sc	1902	Assistant Surveyor, Dominion Topographical Survey.
Guess, George A., M.A	1894	Geo. A. Guess & Co., Mining Engineers, &c., Spokane, Wash.
Guess, H. A., M,A	1895	Chemist, Silver Lake Mines, Silverton, Colo.
Hazlett, J. W., B.A., B.Sc	1903	
Hodgson, Robert T., M.A	1899	Brandon, Man.
Instant, Reginald	1900	Engineer, Canada Corundum Co., Combermere, Ont.
Jackson, H. G., B.Sc	1903	
Kirkpatrick, Guy H., B.Sc., E.M.	1898	Canadian Mounted Rifles, South Africa.
Longwell, A., B.A., B.Sc	1903	
Lodge, W. L., B.Sc.	1903	
Mabee, Horace C., B.Sc	1898	Chemist, Blast Furnace, Deseronto.
*Merritt, Charles P., B.Sc	1899	
Murray, J. C., B.A., B.Sc	1901	Chemist, Londonderry Iron Works, N.S.
McCallum, H. E., B.A., B.Sc	1903	
McClement, Wm. T., M.A	1889	Prof. of Chem., Armour Inst., Chicago.
McDiarmid, S. S. R., B.Sc.	1903	Dominion Land Survey.
Mackenzie, G. C., B.Sc	1903	Blast Furnace, Midland, Ont.
McLennan, J. D., B.A., B.Sc	1902	Assistant Surveyor, Dominion Topographical Survey.
McNab, A. J., B.A., B.Sc	1902	Assistant Surveyor, Dominion Topographical Survey.
MacNeill, W. K., B.Sc	1903	

Name.	Date of Graduation.	Occupation and Address.
McRae, A. D., B.A., B,Sc	1902	Surveyor, Kingston & Pembroke Railway.
Neish, Arthur C., B.A.	1898	Demonstrator, Columbia School of Mines, New York.
Nicol, Wm., M.A.	1889	Prof. of Mineralogy, School of Mines, Kingston.
Noble, D. S., B.Sc	1902	Assistant Surveyor, Dominion Topographical Survey.
Pope, Fred J., M.A.	1890	Mining Engineer, Ricketts & Banks, 104 John St., New York.
Rawlins, J. W., B.A., B.Sc.	1901	Assistant Chemist, Canadian Copper Co., Copper Cliff, Ont.
Redmond, A. V., B.Sc	1903	Engineering Staff Grade Revision, C. P. R.
Reid, J. A., B.Sc	1902	Hamilton Iron & Steel Co., Hamilton, Ont.
Rogers, Will C., B.A	1899	Chemist, Socorro Mine, Chihuahua, Mexico.
Rose, S. L. E., B.Sc.	1903	
Scott, O. N., B.Sc	1903	
Scott, Thomas S., B.A., B.Sc	1898	Civil Engineer, Niagara Falls.
Shorey, E. C., M.A., 1887, D.Sc	1895	Food Commissioner and Government Chemist, Hawaii Territory.
Silver, L. P., B.Sc.	1902	Explorer, Clergue Syndicate, Sault Ste. Marie.
Smeeton, W. F., B.Sc.	1901	Assayer, Tip Top Mine, Ont.
Stevens, F. G., B.Sc., 1900, M.E	1901	Mining Engineer, Rossland, B.C.
Stilwell, A. J., B.Sc.	1902	Grand Forks, B.C.
Sutherland, E., B.Sc.	1902	
Walker, Thomas L., M.A	1890	Prof. of Mineralogy, Toronto University, Toronto.
Wells, James W., B.Sc.	1898	1851 Exhibition Research Scholar.
Wilgar, W. P., B.Sc	1903	Assistant Engineer, Bay of Quinte Railway Survey.
Wood, Isaac, M.A., M.D	1891	Assist. in Chemistry, School of Mining, Kingston.
Workman, C. W., B.Sc	1903	Dominion Land Survey, Saskatoon.

*Deceased.

LIST OF STUDETS.

I.—MATRICULATED STUDENTS.

FIRST YEAR,

Name.	Address,	Branch of Engineering.
Baillie, A. A.	Billing's Bridge	Mechanical.
Bartlett, C. E.	Napanee	Mining.
Berney, K. C	Athens	Mining.
Bolger, E.	Kingston	Electrical.
Browne, P. J	Kingston	Electrical.
Code, E. S. L.	Kingston	Mechanical.
Code, L.	Kingston	Mining.
Connell, F. M.	Spencerville	Mining.
Denovan, J,	Dalkeith	Mining.
Dobbs, G. G	Kingston	Mining.
Dunkley, J. B	Picton	Mining.
Fee, T.	St. Catharines	Mining.
Fenwick, G. P. O.	Apohaqui, N.B.	Chemistry and Mineralogy.
Finnie, H. V	Peterboro	Mining.
Fletcher, W. K.	Saskatoon, Sask.	Mining.
Forin, P. McL.	Belleville	Mining.
Gibson, E, R.	Napanee	Electrical.
Grenon, J. F.	Chicontimi, P.Q	Civil.
Hill, J	Harrington	Mining.
Horsey, E. N	Kingston	Electrical.
Houston, D. W.	Omaha, Neb.	Mining.
Kilburn, D. G.	Stratford	Mining.
Lennox, J. S	Kingston	Electrical.
Lodge, W. L.	Charlottetown, P.E.I.	Chemistry and Mineralogy
Malloch, G. S., B.A.	Hamilton	Geology and Mineralogy.
Martin, H. E	Cataraqui	Mining.
Millar, R.	Kingston	Mining.
McCulloch, R.	Souris, Man.	Electrical.
McGinnis, W. C.	Belleville	Mining.
Mackenzie, H. A	Moulinette	Electrical.
McLaren, G. R.	Perth	Mining.
McLaren, W. M	Osceola	Mining.
McMullen, H. D.	Picton	Mining.
Pinkerton, W.	Portland	Electrical.
Rice, F. W.	Perth	Mining.
Richardson, G. T.	Kingston	Mining.
Ross, W. F.	St. Peter's, N.S.	Mining.
Shorey, P. M.	Picton	Mining.
Simpson, E. R	Kingston	Mining.
Smith, J. G.	London	Mining.

Name.	Address.	Branch of Engineering.
Smith, S. G.	Aylmer, Que	Mining.
Speirs, T.	Appleton	Electrical.
Stiles, L. P.	Cornwall	Electrical.
Timm, W. B	Westmeath	Mining.
Walker, H., B.A	Metcalfe	Electrical.
Weld, W. E.	London	Mining.

SECOND YEAR.

Baker, C. W	Kingston	Chemical.
Bateman, G. C	Kingston	Mining.
Cairnes, D. D.	Grand Forbes	Mining.
Carr-Harris, A	Kingston	Mining.
Cartwright, C. T	Portsmouth	Mining.
Clarke, C. F.	Brockville	Mining.
Collins, E. A	Smithfield	Mining.
Cumming, A. L.	Cornwall	Mining.
Dillabough, J, V	North Williamsburg	Electrical.
Eyre, W. H	Whitehurst	Mining.
Fairlie, T. U	Kingston	Mining.
Gage, R. G		Electrical.
Garrow, R. M.	Webbwood	Mining.
Grant, J. R.	Chesley	Civil.
Harper, W. B.	Baie Verte, N.B.	Civil.
Keith, G. C	Smith's Falls	Mining.
Montgomery, O. M	Lanark	Electrical.
McArthur, E	Copper Cliff	Mining.
McEwen, R. L	Carleton Place	Mechanical.
MacIlquham, W. L	Lanark	Electrical.
Osborne, H	Kingston	Electrical.
Purdy, G. M	Sydenham	Mining.
Ross, D. E.	North Bedeque, P.E.I	Mining.
Scott, H. H	Perth	Electrical.
Sears. J.	Kingston	Mining.
Shaver, P. A	Grantley	Mining.
Sloan, D	Perth	Mining.
Squire, S. H.	Kingston	Mechanical.
Way, W. C	Lindsay	Mining.
Wilson, R. J.	Kingston	Electrical.

THIRD YEAR.

Brown, T.	Hawkesbury	Mining.
Cavers, T. W	Carleton Place	Mining.
Corkill, E. T	Sydenham	Mining.
Dennis, E. M.	Burgessville	Mining.
Dobbs, W. S	Kingston	Mining.
Knight, C. W	Kingston	Mining.
Milden, A. J.	Cornwall	Civil.

Name.	Address.	Branch of Engineering.
McKay, R. B	Cornwall	Mining.
Mackie, G. A	Kingston	Mining.
Smyth, W. L	Pembroke	Electrical.
Squire, R. L	Kingston	Mining.
Stanley, J. N., M.A	Port Colborne	Mining.
Strachan, B. O.	Kingston	Mining.
Sutherland, T. F	New Carlisle	Mining.
Webster, A. R	Lansdowne	Electrical.
Wilson, E. E. D	Nelson, B.C.	Mining.
Wright, A	Brockville	Mining.

FOURTH YEAR.

Name.	Address.	Branch of Engineering.
Baker, J. C.	Osnabruck Centre	Mining.
Chaplin, G. W	St. Catharines	Mining.
Craig, H. B. R.	Kingston	Civil.
Drummond, L. E		Mining.
Ferguson, M	Kingston	Civil.
Finlayson, M. D.	Grand River, N.S	Mining.
Gordanier, W. N	Napanee	Electrical.
Graham, S. N., B.Sc.	Kingston	Mining.
Harper, W. B.	Baie Verte, N.B.	Civil.
Hazlett, J. W.. B.A.	Kingston	Mechanical.
Jackson, H. G	Lindsay	Mining.
Longwell, A., B.A.	Foxboro	Mining.
Malone, E. E.	Toronto	Mining.
McCallum, H. E., B.A	Kingston	Mining.
McDiarmid, S. S. R.	Woodstock	Mining.
MacKenzie, G. C	Brantford	Mining.
Mackie, F. H.	Kingston	Mining.
Mackie, G. A.	Kingston	Mining.
MacNeill, W. K.	Embro	Mining.
Pense, E. H.	Kingston	Mining.
Redmond, A. V.	Kingston	Mining.
Rose, S. L. E.	Tamworth	Electrical.
Tett, B.	Newboro	Mineralogy and Geology.
Thompson, A. T.	Kingston	Mining.
Wilgar, W. P.	Cobourg	Mining.
Workman, C. W.	Kingston	Mining.
Workman, J. K.	Kingston	Mineralogy and Geology.

II.—UNMATRICULATED STUDENTS.

FIRST YEAR.

Name.	Address.	Branch of Engineering.
Coe, A. P.	Madoc	Mining.
Lawrence, F. H	Petitcodiac, N.B	Electrical.
Wilkinson, G. M	Kingston	Mining.

THIRD YEAR.

Name.	Address.	Branch of Engineering.
Anson-Cartwright, R. H. M.	Belleville	Mining.
Belfour, H. M	Bath	Mining.

III.—SPECIAL STUDENTS.

Name.	Address.
Jameson, W. B	Newlands, Eltham, Eng.
McIntosh, P. A., B.A	Dundela.
Nissen, P. N	
Stewart, G. M	Toronto.
Trull, F. G	Darlington.
Wells, J. W., B.Sc	Toronto.

GRADUATES, 1903.

B.Sc.

Name.	Address.	Branch of Engineering.
Baker, J. C.	Osnabruck Centre	Mining.
Craig, H. B. R.	Kingston	Civil.
Finlayson, M. D.	Grand River, N.S.	Mining.
Gordanier, W. N	Napanee	Electrical.
Graham, S. N., B.Sc.	Kingston	Mining.
Hazlett, J. W., B.A.	Kingston	Chemistry and Mineralogy.
Jackson, H. G	Lindsay	Mining.
Lodge, W. L.	Charlottetown, P.E.I.	Chemistry and Mineralogy.
Longwell, A., B.A.	Foxboro	Mineralogy and Geology.
McCallum, H. E., B.A.	Kingston	Mining.
McDiarmid, S. S. R.	Wookstock	Mining.
MacKenzie, G. C	Brantford	Mining.
MacNeill, W. K.	Embro	Chemistry and Mineralogy.
Redmond, A. V.	Kingston	Chemistry and Mineralogy.
Rose, S. L. E.	Tamworth	Electrical.
Scott, O. N.	Listowel	Mineralogy and Geology.
Wilgar, W. P	Cobourg	Mining.
Workman, C. W	Kingston	Mining.

PRACTICAL SCIENCE SCHOLARSHIPS.

Chancellor's—Shorey, P. M., Picton.

"*Graduate*" *in Chemistry*—H. Malcolm, Tilsonburg, O. Montgomery, Lanark, } equal.

"*Bruce Carruthers*" *in Mining*—T. F. Sutherland, New Carlisle: Que.
R. B. McKay, Cornwall, Ont.

PASS LISTS.

SUPPLEMENTAL EXAMINATIONS, SEPTEMBER, 1902.

Junior Mathematics—Scott, O. N.

Algebra of Mathematics I—Thompson, A. T., Anson-Cartwright, R. H. M.

Astronomy—Osborne, H., Milden, A. J., Shaver, P. A., Strachan, B. O.

Senior Mathematics—Wright, A.

Junior Physics—Strachan, B. O.

Physics, I—Shaver, P. A., Milden, A. J.

Senior Physics—Wright, A., Thompson, A. T.

Junior Chemistry—Clarke, C. F., Eyre, W. H. S.

Senior Chemistry—Sears, J., Pense, E. H.

Systematic Mineralogy—Drummond, L. E.

General Engineering (*Theory of Structures and Graphical Statics*) —Baker, J. C.

Pass Geology—Cavers, T. W.

Petrography—Div. II, Malone, E. E.; *Div. III*, Drummond, L. E., Pense, E. H., Chaplin, G. W.

Surveying III—Drummond, L. E.

Surveying I—Cumming, A. L., Hazlett, J. W., Eyre, W. H.

SESSIONAL EXAMINATIONS, APRIL, 1903.

Junior English—(Div. I.) G. R. McLaren, James Hill; (Div. II.) P. M. Shorey, E. R. Simpson, W. K. Fletcher; (Div. III.) G. T. Richardson, W. Pinkerton, J. B. Dunkley, J. S. Lennox, W. B. Timm, W. C. McGinnis, H. V. Finnie, W. E. Weld, R. McCulloch, H. A. McKenzie, L. B. Code, K. C. Berney, E. S. L. Code, C. E. Bartlett, F. H. Lawrence, A. P. Coe.

Mathematics I.—(Div. I.) H. A. McKenzie, K. C. Berney, H. V. Finnie, P. M. Shorey, R. M. McCulloch, J. Hill; (Div. II.) J. S. Lennox, F. H. Lawrence, C. E. Bartlett, W. B. Timm, P. McL. Forin, G. G. Dobbs, W. A. Pinkerton; (Div. III.) G. R. McLaren, D. W, Houston, W. K. Fletcher, L. B. Code, S. G. Smith, R. Miller, W. E. Weld, G. S. Malloch, P. G. Brown, L. P. Stiles, E. S. L. Code, G. T. Richardson, E. N. Horsey, J. Sears, J. Workman, W. C. McGinnis, T. Fee, T. Spiers.

Descriptive Astronomy—(Div. I.) L. B. Code, H. V. Finnie, J. Hill, J. Sears, R. McCulloch, G. S. Malloch, W. K. Fletcher; (Div. II.) F. W. Rice, H. A. Mackenzie, G. R. McLaren, A. A. Baillie, C. E. Bartlett, E. S. L. Code, E. R. Simpson, K. C. Berney, W. Pinkerton, J. G. Smith. P. Browne; (Div. III.) E. N. Horsey, F. H. Lawrence, J. B. Miller, P. McL. Forin, J. S. Lennox, J. Denovan, J. B. Dunkley, G. G. Dobbs, W. E. Weld, D. W. Houston, W. B. Timm, T. Fee, W. C. McGinnis, T. Spiers, D. Sloan, P. M. Shorey, L. P. Stiles, R. M. Garrow, A. L. Cumming.

Mathematics II.—W. C. Way, C. M. Montgomery, W. L. McIlquham, D. D. Cairnes, J. R. Grant, D. E. Ross, A. Carr-Harris, J. V. Dillabough, T. U. Fairlie, E. A. Collins, G. C. Bateman, J. G. Smith, R. L. McEwen, R. J. Wilson, H. H. Scott, W. L. Smyth, D. Sloan, R. Gage, A. L. Cumming, C. W. Baker, A. Thompson, M. Ferguson.

Spherical Trigonometry only.—R. B. McKay, E. M. Dennis, C. W. Workman, H. G. Jackson, T. Brown, W. P. Wilgar, R. H. M. Anson-Cartwright, J. K. Workman, T. W. Cavers, G. C. McKenzie, F. H. Mackie, S. S. McDiarmid, C. W. Knight, M. D. Finlayson, B. O. Strachan, R. Squire, E. Malone, A. Wright.

Conics.—H. B. R. Craig, G. C. McKenzie, E. T. Corkill, C. W. Workman, T. Brown, F. Sutherland.

Calculus.—R. B. McKay, G. C. McKenzie, E. Malone, C. W. Workman, E. M. Dennis, C. W. Knight,

Physics, I.—(Div. I.) R. McCulloch, H. A. McKenzie, K. C. Berney, P. M. Shorey ; (Div. II.) C. E. Bartlett, H. V. Finnie, Jas. Hill, J. S. Lennox, F. W. Rice, W. K. Fletcher, F. H. Lawrence, G. Dobbs, G. R. McLaren, P. McL. Forin ; (Div. III.) L. P. Stiles, W. A. Pinkerton, L. B. Code, J. Denovan, Thomas Fee, G. T. Richardson, E. S. L. Code, P. Brown, W. C. McGinnis, A. V. Red mond, J. Sears, W. B Timm.

Junior Physics.—(Div. III.) J. K. Workman, M. Ferguson.

Physics II.—(Div. I.) O. M. Montgomery, W. L. McIlquham, W. C. Way, A. Carr-Harris ; (Div. II.) D. D. Cairnes, J. V. Dillabough, J. R. Grant, T. U. Fairlie, J. G. Macphail, C. W. Baker, P. A. Shaver, C. T. Cartwright ; (Div. III.) David Sloan, J. G. Smith, H. Osborne, D. E. Ross, H. H. Scott, W. S. Dobbs, E. A. Collins.

Senior Physics.—(Div. II.) G. S. Malloch.

Physics, III.—(Div. I.) W. C. Way, J. V. Dillabough, O. M. Montgomery ; (Div. II.) W. L. McIlquham, H. H. Scott ; (Div. III.) H. Osborne, R. G. Gage, W. L. Smyth.

Physics, IV.—(Div. I.) H. Walker.

Junior Chemistry.—(Div. I.) C. E. Bartlett, K. C. Berney, H. V. Finnie ; (Div. II.) R. M. McCulloch and P. M. Shorey, equal ; J. Hill and H. A. McKenzie, equal ; E. S. L. Code and J. S. Lennox, equal ; L. B. Code, F. W. Rice, G. T. Richardson, E. R. Simpson ; H. Osborne and W. B. Timm, equal ; (Div. III.) G. R. McLaren, F. M. Connell, W. A. Pinkerton ; W. E. Weld and J. Denovan, equal ; W. M. McLaren ; F. H. Lawrence, S. G. Smith and A. L. Cumming, equal ; P. M. Forin, W. F. Ross.

Senior Chemistry.—(Div. I.) O. M. Montgomery, D. D. Cairnes, T. U. Fairlie ; (Div. II.) W. C. Way, G. S. Malloch, D. E. Ross ; J. V. Dillabough and A. Carr-Harris, equal ; H. H. Scott, J. R. Grant and W. L. McIlquham, equal ; D. Sloan, P. Shaver ; G. C. Bateman, E. A. Collins and C. T. Cartwright, equal ; (Div. III.) C. W. Baker, R. G. Gage, R. M. Garrow.

Industrial Chemistry, Course A. –(Div. I.) E. M. Dennis ; (Div. II.) T. Brown ; R. B. McKay and T. F. Sutherland, equal ; E. T. Corkhill, R. Squire ; (Div. III.) W. S. Dobbs, E. E. Wilson, T. W. Cavers, R.. H. M. Anson-Cartwright, B. Strachan. *Course B.*—Div. III.) G. P. Fenwick, F. D. Reid.

Physical Chemitsry, I.—(Div. III.) H. Walker, F. D. Reid, A. V. Redmond.

Physical Chemistry, II,—(Div. I.) W. L. Lodge.

Qualitative Analysis.–(Div. I.) A. Carr-Harris, D. D. Cairnes, W. F. Ross, equal ; G. M. Purdy, D. E. Ross. equal ; Cosmo Cartwright, A. A. Collins, W. C. Way, equal ; (Div. II.) G. S. Malloch, T. U. Fairlie, J. G. Smith, W. H. Eyre, D. Sloan, G. C. Bateman; (Div. III.) G. C. Keith.

Elementary Mineralogy and Blowpipe Analysis.—(Div. I.) G. S. Malloch, J. G. Smith ; (Div. II.) W. B. Timm, K. C. Berney, G. G. Dobbs, P. McL. Forin, James Hill, C. E. Bartlett, G. R. McLaren, W. K. Fletcher, W. F. Ross, P. M. Shorey ; (Div. III.) A. P. Coe, G. C. Keith, J. Sears, W. E. Weld, H. D. McMullen, R. D. Millar, D. W. Houston, G. T. Richardson, W. H. Eyre.

Optical Mineralogy.—(Div. I.) D. D. Cairnes, T. U. Fairlie, A. Carr-Harris ; (Div. II.) G. C. Bateman, G. M. Purdy, D. E. Ross, E. M. Dennis, T. Brown, C. T. Cartwright, W. L. Lodge, W. H. Eyre, D. Sloan, H. M. Belfour ; (Div. III.) E. A. Collins, J. N. Stanley, F. W. Cavers, B. O. Strachan.

Descriptive and Determinative Mineralogy.—(Div. I.) J. N. Stanley, S. N. Graham ; (Div. II.) R. H. M. Anson-Cartwright, F. D. Reid, R. Squire, J, W. Hazlett, E. E. D. Wilson, E. E. Malone, A. Wright ; (Div. III.) R. B. McKay. C. W. Knight, T. F. Sutherland, H. M. Belfour, G. W. Chaplin.

Quantitative Analysis and Assaying.—(Div. I.) J. N. Stanley, T. W. Cavers ; (Div. II.) T. Brown, G. P. O. Fenwick, R. Squire, E. E. D. Wilson, R. H M. Anson Cartwright, T. F. Sutherland, E. M. Dennis, R. B. McKay, F. D. Reid ; (Div. III.) J. A. Fife, G. A. Mackie, J. K. Workman, A. Wright, H. M. Belfour, B. O. Strachan, L. E. Drummond, E. T. Corkhill.

Geology, I.—(Div. I.) D. D. Cairnes, T. U. Fairlie, H. B. R. Craig, D. E. Ross, J. R. Grant ; (Div. II.) J. G. Smith, C. T. Cartwright, G. C. Bateman, A. Carr-Harris, G. S. Malloch, D. Sloan G. M. Purdy ; (Div. III.) E. A. Collins, A. G. Cumming, H. D. McMullen.

Petrography I—(Div. I.) C. W. Knight, E. M. Dennis. (Div. II) J. N. Stanley, R. B. McKay, T. Brown, F. D. Reid, J. W. Hazlett,, W. L. Lodge. (Div. III.) T. W. Cavers.

Geology of Canada—(Div. I.) E. M. Dennis. (Div. II.) C. W. Knight, T. Brown, J. N. Stanley, G. P. O. Fenwick. (Div.

III.) R. B. McKay, E. E. B. Wilson, E. T. Corkill, T. F. Sutherland, J. W. Hazlett, F. D. Reid, B. O. Strachan, T. A. Cavers, R. H. M. Anson-Cartwright.

Economic Geology—(Div. I.) E. M. Dennis, C. W. Knight, T. Brown. (Div. II.) J. N. Stanley, R. B. McKay, E. E. D. Wilson, T. W. Cavers, J. W. Hazlett. (Div. III.) B. Tett, R. L. Squire, T. F. Sutherland, F. D. Reid, E. T. Corkill.

Geology II—(Div. III.) J. W. Hazlett.

Petrography II—(Div. I.) A. Longwell. (Div. II.) J. K. Workman. (Div. III.) W. K. MacNeil, B. Tett.

Geology III—(Div. I.) A. Longwell. (Div. II.) W. K. MacNeil, J. K. Workman. (Div. III.) B. Tett.

Botany—(Div. II.) J. K. Workman, A. A. Bailie.

Pass Animal Biology—(Div. I.) G. S. Malloch. (Div. III.) J. K. Workman, B. Tett.

Mining I (Third Year)—(Div. I.) J. N. Stanley, E. M. Dennis, T. W. Cavers, R. Squire. (Div. II.) E. E. D. Wilson, H. E. McCallum, R. B. McKay, E. T. Corkill, T. F. Sutherland, T. Brown. (Div. III.) G. W. Chaplin, R. H. Anson-Cartwright, A. Wright, H. M. Belfour, B. O. Strachan.

Mining II—(Div. I.) G. C. McKenzie and S. S. McDiarmid, equal; S. N. Graham, M. D. Finlayson, J. C. Baker and F. H. Mackie, equal. (Div. II.) H. G. Jackson, H. E. McCallum, W.P. Wilgar, L. E. Drummond, E. H. Pense, C. W. Knight. (Div. III.) G. W. Chaplin.

Mining Project—(Div. I.) S. N. Graham; S. S. McDiarmid and J. C. Baker, equal; G. C. McKenzie. (Div. II.) M. D. Finlayson, H. G. Jackson, E. H. Pense, W. P. Wilgar, F. H. Mackie. (Div. III.) C. W. Workman, H. E. McCallum.

Milling Laboratory—(Div. I.) G. C. McKenzie, S. N. Graham, J. C. Baker, M. D. Finlayson and S. S. McDiarmid equal; H. G. Jackson. (Div. II.) W. P. Wilgar, G. W. Chaplin, E. H. Pense. (Div. III.) H. E. McCallum, F. H. Mackie, E. E. Malone.

Metallurgy I—(Div. I.) E. M. Dennis, T. Brown, G. P. O. Fenwick. (Div. II.) R. B. McKay, R. Squire, J. W. Hazlett, E. E. D. Wilson, J. N. Stanley. (Div. III.) F. D. Reid, A. Wright, T. W. Cavers, E. T. Corkill, J. A. Fife.

Ore Dressing—(Div. I.) R. B. McKay, T. Brown. (Div. II.) T. F. Sutherland, C. W. Knight, R. L. Squire, T. W. Cavers, E. T. Corkill, E. M. Dennis, J. N. Stanley, A. Wright. (Div. III.) G. W. Chaplin, E. E. D. Wilson.

Metallurgy II—(Div. I.) S. N. Graham, G. C. McKenzie, W. P. Wilgar; (Div. II.) F. H. Mackie, W. G. Jackson, S. S. McDiarmid, C. W. Knight, E. H. Pense; (Div. III.) J. C. Baker, H. E. McCallum, C. W. Workman.

Thermodynamics I—(Div. I.) H. B. R. Craig, J. N. Stanley, E. M. Dennis, H. E. McCallum; (Div. II.) H. Walker, R. B. McKay, T. W. Cavers, G. C. McKenzie; (Div. III.) T. Brown, R. L. Squire, C. W. Workman, C. W. Knight, E. Malone, T. F. Sutherland, R. H. Anson-Cartwright.

Thermodynamics II—(Div. II.) S. L. E. Rose; (Div. III.) W. N. Gordanier.

General Engineering I (Materials of Construction)—(Div. I.) D. D. Cairnes, O. M. Montgomery, W. C. Way, J. V. Dillabough, W. L. McIlquham, D. E. Ross, J. R. Grant, T. U. Fairlie; (Div. II.) G. C. Bateman, J. G. Smith, A. Carr-Harris, D. Sloan, E. A. Collins, H. H. Scott, H. Walker; (Div. III.) J. Sears, C. T. Cartwright, C. W. Baker, H. D. McMullen, G. M. Purdy, P.A. Shaver, R. J. Wilson, R. G. Gage, A. L. Cumming, H. Osborne.

General Engineering II, (Graphical Statics)—(Div. I.) E.T. Corkill; (Div. II.) W. P. Wilgar, J. N. Stanley, H. E. McCallum, E. M. Dennis, T. W. Cavers; (Div. III.) F. H. Mackie, A. R. Webster, A. Wright, R. B. McKay; T. Brown, W. L. Smythe, equal; B. O. Strachan, W. N. Gordanier, J. A. Milden, M. D. Finlayson.

General Engineering II (Theory of Structures)—(Div. I.) M. D. Finlayson; (Div. II.) J. N. Stanley, W. N. Gordanier, T. W. Cavers, R. B. McKay; (Div. III.) E. Malone, H. E. McCallum, F. H. Mackie, T. Brown, E. M. Dennis; R. Squire, A. J. Milden, equal; A. T. Thompson, B. O. Strachan, equal; M. Ferguson, A. R. Webster, equal.

General Engineering III (Hydraulics)—(Div. I.) C. W. Workman, H. E. McCallum, H. Walker, S. L. Rose; (Div. II.) H. B. R. Craig, J. C. Baker, W. P. Wilgar, G. C. McKenzie, W. N. Gordanier, F. H. Mackie; (Div. III.) S. S. McDiarmid, H. G. Jackson, A. T. Thompson, A. R. Webster, E. H. Pense.

Electrical Engineering I—(Div. I.) J. N. Stanley, H. Walker, H. B. R. Craig; (Div. II.) E. M. Dennis, G. C. McKenzie, R. B. McKay, W. L. Smythe, T. W. Cavers, T. Brown, C. W. Workman; (Div. III.) E. Malone, E. T. Corkill, H. E. McCallum, T.F. Sutherland, E. H. Pense, E. E. D. Wilson, B. O. Strachan, H. M. Belfour, M. Ferguson, A. J. Milden.

Electrical Engineering II—(Div. I.) H. Walker; (Div. III.) W. L. Smythe, A. R. Webster.

Electrical Engineering III—(Div. II.) S. L. E. Rose; (Div. III.) W. N. Gordanier.

Electrical Engineering IV—(Div. I.) S.L.E. Rose; (Div. III.) W. N. Gordanier.

Electrical Engineering V—(Div. II.) S. L. E. Rose, W. N. Gordanier.

Railway Construction I—H. B. R. Craig, M. Ferguson.

Railway Construction II—H. B. R. Craig, M. Ferguson, A. J. Milden.

Railway Construction III—J. N. Stanley, R. B. McKay, L. E. Drummond, T. W. Cavers, T. Brown, E. T. Corkill, E. M. Dennis, A. Wright.

Maintenance of Railways—H. B. R. Craig, M. Ferguson, A.J. Milden.

Municipal Engineering—H. B. R. Craig, M. Ferguson, A. J. Milden.

Foundations—H. B. R. Craig, M. Ferguson, A. J. Milden.

Mechanical Engineering I—(Div. II.) H.Walker; (Div. III.) A. T. Thompson, A. R. Webster.

Mechanical Engineering II—(Div. II.) H. Walker; (Div. III.) W. L. Smythe, A. R. Webster.

Mechanical Engineering IV—(Div. I.) S. N. Graham, H. G. Jackson, S. L. E. Rose, W. N. Gordanier; (Div. II.) H. B. R. Craig, M. D. Finlayson, S. S. R. McDiarmid, W. P. Wilgar; (Div. III.) J. C. Baker, G. C. McKenzie, M. Ferguson, F. H. Mackie.

Mechanism—J. C. Baker, H. G. Jackson, G. C. McKenzie, S. S. McDiarmid, H. H. Walker, M. D. Finlayson, W. P. Wilgar, E. H. Pense, C. W. Workman, A. Thompson, H. E. McCallum.

Mechanical Laboratory, Carpentry—C. E. Bartlett, K. C. Berney, A. A. Bailie, E. Bolger, P. J. Brown, A. P. Coe, E. S. L. Code, L. Code, F. M. Connell, J. B. Dunkley, J. Denoven, G. G. Dobbs, W. K. Fletcher, H. V. Finnie, T. Fee, P. McL. Forin, J. Hill, E. N. Horsey, D. H. Houston, D. G. Kilborn, F. B. Lawrence, J. S. Lennox, H. A. McKenzie, W. C. McGinnis, R. Miller, G. R. McLaren, H. E. Martin, J. G. McPhail, W. M. McLaren, W. Pinkerton, G. T. Richardson, W. F. Ross, P. M. Shorey, L. P. Stiles, E. R. Simpson, S. G. Smith, J. Sears, T. Spiers, W. B. Timm, H. Walker, R. M. McCulloch, J. F. Grenon, J. G. Smith, F. Rice.

Machine Shop—E. A. Collins, D. Cairnes, J. V. Dillabough, R. Gage, D. E. Ross, M. R. Garrow, J. R. Grant, C. T. Cartwright, G. C. Bateman, T. U. Fairlie, W. C. Way, R. L. McEwen, W. H. Eyre, W. B. Harper, G. C. Keith, H. Scott, C. F. Clarke, A. J. Milden, H.Walker, R. J. Wilson, P. Shaver, H. Osborne, A. Carr-Harris, A. L. Cumming, C. W. Baker, W. E. Weld, R. L. McIlquham, W. L. Smythe, G. M. Purdy, O. Montgomery, D. Slcan, A. R. Webster, J. G. McPhail, A. A. Bailie.

Drawing I—(Div. I.) H. V. Finnie, P. M. Shorey, D. W. Houston, K. C. Berney, J. Denovan, F. W. Rice, W. B. Timm, R. McCulloch, R. Millar, C. E. Bartlett; (Div. II.) S. G. Smith, G. G. Dobbs, J. S. Lennox, H. A. McKenzie, F. H. Lawrence, P.

McL. Forin, G. R. McLaren, W. K. Fletcher, E. R. Simpson, T. Fee, J. Sears, E. N. Horsey, T. Speirs, W. E. Weld, J. B. Dunkley, A. A. Bailie, L. B. Code, W. F. Ross, James Hill; (Div. III.) W. A. Pinkerton, L. P. Stiles, H. D. McMullen, E. S. L. Code, G. T. Richardson, F. M. Connell, J. N. Hazlett, W. McGinnis, H. Walker, A. Longwell, A. P. Coe, G. A. Mackie.

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Surveying II—(Div. I.) D. D. Cairnes, W. C. Way, G. C. Bateman, T. U. Fairlie, J. R. Grant, J. N. Stanley, D. E. Ross; (Div. II.) E. M. Dennis, A. Carr-Harris, E. A. Collins, G. C. Keith, W. F. Ross, T. Brown; (Div. III.) A. Wright, C. F. Clark, C. T. Cartwright, H. Osborne, G. M. Purdy, T. W. Cavers, W. H. Eyre, A. L. Cumming, H. M. Belfour, R. M Garrow.

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(5) Physics I.
(1) Forestry (General).
(3) Jr. Chemistry.
(3) Botany.
(1) Elementary Mineralogy.
(5) Drawing I.
(5) Workshop I.

SECOND YEAR.

(6) Mathematics II.
(1) Chemistry (Plants and Soils).
(4) Physics II.
(2) Geology I.
(1) Geology (Soils, &c.)
(1) Botany (Geographical).
(2) Dendrology.
(1) Plant Physiology.
(1) Entomology.
(1) Natural History of Vertebrates.
(2) Drawing (Topog.)
(3) Surveying and Mapping I.
(5) Forestry.
(4) Workshop II.

THIRD YEAR.

(1) Botany (Fungi &c.)
(1) Geology II (Physical Geog.)
(1) Fish Culture and Game Preservation.
(3) Silviculture.
(3) Forest Protection.
(3) Forest Exploitation and Surveying.
(5) Forestry Mensuration and Estimating.
(2) Surveying II.
(2) General Engineering I.
(2) Thermodynamics.

FOURTH YEAR.

(1) Civil Engineering I (Common Roads).
(3) (Jr. Political Science) Economics.
(2) General Engineering II (Timber Physics and Wood Technology).
(5) Silviculture.
(2) Forest Protection.
(2) Forest Regulation.
(2) Forest Valuation and Finance.
(2) Forest Administration.
(2) Forest Policy.
(1) History of Forestry.

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B.—Three Year's Course for a Diploma in Forestry.

FIRST YEAR.

Mathematics I.
Physics I.
Forestry (General).
Jr. Chemistry.
Botany.
Elementary Mineralogy.
Drawing I.
Workshops I.

SECOND YEAR.

Chemistry (Plants & Soils).
Animal Biology.
Geology I.
Botany (Geographical and Ecological).
Dendrology.
Plant Physiology.
Entomology.
Drawing (Topog.)
Surveying I.
Forestry.
Silviculture.
Forest Mensuration & Timber Estimating.

THIRD YEAR.

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Silviculture.
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